THE AMERICAN
JOURNAL OF PHARMACY.

JULY, 1884.

BISMUTH AND PEPSIN.

By R. Rother.

Considerable uncertainty still exists in regard to the constitution of the multiple citrates. The writer believes to have elucidated certain obscure points about their structure and to have greatly simplified the methods of their production. These considerations and processes are published in the "American Journal of Pharmacy" for March, 1876, April, 1876, January, 1883, March, 1883 and April 1883. It is there shown that in case of the iron salts, for instance, the direct application of ferrous or ferric citrate is vastly more definite, practical and expeditious than the older processes, which are the reverse of this. The results obtained by the new method are in numerous instances chemically identical with those of the former method, and in the remaining cases a close approximation to them. A great improvement was also made in the production of bismuth citrate, and as an immediate consequence, in that of the ammonio-citrate. In treating of this latter compound ("American Journal of Pharmacy," March, 1876) the writer stated that a crystalline modification of it exists. On this occasion a constitutional formula of the ammonio-citrate was given. Subsequently, however "American Journal of Pharmacy," March, 1883), the writer was enabled by means of a different method to establish a more accurate formula. The fact has since been ascertained that the crystalline salt results from a deficiency of ammonia consequent upon its dissipation by the action of heat or even simple exposure at ordinary temperatures. The writer found that by heating one m. of bismuth citrate with two ms. of ammonium bicarbonate in the presence of about ten times their weight of water, a perfect solution rapidly results, attended by copious effervescence of carbonic anhydrate. By augmenting the citrate further combination takes place and thus generates the crystalline compound above referred to. A further increase of the the citrate is also absorbed, whilst the compound becomes more and

more insoluble. When the citrate is so far augmented as to stand in the proportion of one m. to one m. of the bicarbonate the whole of it does not combine. By treating one m. of bismuth citrate in a similar manner with two ms. of sodium bicarbonate a perfect solution is obtained which on evaporation yields a slightly deliquescent colorless scaled salt. The same results when one m. of sodium monocarbonate is used. An excess of either carbonate on the application of heat precipitates a bulky and gelatinous bismuthyl carbonate. Excess of citrate is absorbed as in the case of the ammonium salt. A small excess yields a clear solution which on condensation gives a white granular and soluble residue. An increased amount of citrate up to one m. for one m. of the bicarbonate enters into combination, but the resulting compound is only soluble in a very large volume of water aided by heat.

One m. of bismuth citrate treated with two ms. of potassium bicarbonate or one m. of the monocarbonate in the preceding manner also gives a clear solution, decomposable by excess of carbonates, and yields on evaporation a very deliquescent colorless scaled salt. A slight excess of citrate readily dissolves and then produces, as in case of the sodium compound, a granular very soluble residue. An increase of the citrate up to one m. for one m. of the bicarbonate readily combines forming a rather freely soluble compound having a decided acid reaction and being possessed of absolute permanence in any volume of water. It is not decomposed by neutral chlorides, but chlorhydric acid destroys it with precipitation.

The salt generated by two ms. of potassium bicarbonate and one m. of bismuth citrate, and to which sodium and ammonium form corresponding analogues, is constitutionally represented by the formula:

$$\begin{array}{l} Bi = (OH)_2 \\ | \\ Ci = K_2 \end{array}$$

Then the salt formed by one m. of the bicarbonate may be indicated by the formula:

$$\begin{array}{l} Bi - (OH) \\ \| \\ Ci - K \end{array}$$

There are, however, plausible reasons that the structural symbol is

$$\begin{array}{l} Bi = O \\ | \\ H - Ci - K. \end{array}$$

A mixture of this acid salt with the preceding neutral one results when an excess of bismuth citrate reacts upon the alkaline carbonates as already explained above. This mixture is absolutely permanent in aqueous solution, but the chief interest attaching to it rests in the fact that it forms no insoluble combinations with pepsin. The perfect stability of the solution renders it the achieved desideratum upon which the following process for a perfect and permanent acidulous solution of bismuth and pepsin is based:

Pepsin saccharated	250 parts.
Bismuth citrate	100 "
Potassium bicarbonate sufficient.	
Diluted chlorhydric acid	20 "
Alcohol	1,000 "
Water sufficient to make	10,000 "

Mix the diluted chlorhydric acid with 3,000 parts of water, add the pepsin, and macerate the mixture for several days, or until the pepsin is dissolved; then add a crystal of potassium bicarbonate, and when effervescence has ceased decant the solution. Mix the bismuth citrate and 40 parts of potassium bicarbonate with 4,000 parts of water and heat the mixture until effervescence has ceased and filter the solution. Mix the alcohol with 1,000 parts of water and add it to the pepsin and bismuth solutions previously mixed together, with enough water to make the solution weigh 10,000 parts.

Remedy for Rhus Poisoning.—As this is the season when many persons are making excursions into the country, it is to be expected that there will be many who will suffer from poison contracted by contact with the poison oak. Various remedies have been employed to relieve the suffering thus occasioned, but while one remedy is advantageous to some persons it utterly fails with others. Having learned of a great number of cases in which fluid extract of serpentaria has been used with remarkable success, I thought it would be well to communicate the fact to your journal, as I have never seen it noticed in medical or pharmaceutical journals. It is best applied by placing cloths moistened with the extract upon the affected parts, without any friction. Two or three applications generally effect a cure.

T. S. Wiegand.

ON SYRUP OF TOLU.

By E. Claassen.

The beautiful yellow color and the fine appearance of the Syrup of Tolu prepared according to the formula of the old Pharmacopœia are, without doubt, the reason that many apothecaries continue, without making any tests, to prefer this syrup to that made as the new Pharmacopœia directs. An exact answer to the question, "Which of these two syrups has more strength, and is the best one?" seemed to be, therefore, both interesting and useful. For this purpose I took equal quantities of the syrup prepared from the Tincture of Tolu by means of magnesium carbonate and of the syrup made directly from the balsam. It is well known, as I may state here, that all the effect and power of the Syrup of Tolu is lying in the presence in it of the benzoic and cinnamic acids. These two acids are easily soluble in ether; ether will extract them readily from the syrup, leaving of them behind but a small balance. Each one of these two samples of syrup was therefore shaken with an equal volume of ether, and the ether, after separation from the syrup, evaporated in a glass dish in the open air. The ether taken from the syrup made directly from the balsam left a considerable quantity of a yellowish white residue having the characteristic smell and properties of the two acids, while the ether shaken with the syrup made from the tincture of Tolu left behind a small amount of resinous matter only. After addition, however, of some hydrochloric acid, enough to acidulate the syrup, and after shaking with ether, the last one left, when evaporated, a good deal of the acids. By this experiment it was evidently demonstrated, that in this syrup the acids in question were not present in a free state, but were liberated by the hydrochloric acid added. If any doubt could be sustained that they were combined with magnesium in the syrup, this doubt was at once destroyed by the chemical test made, viz., by the white crystalline precipitate resulting after the addition of sodium-ammonium phosphate. The magnesium carbonate used for preparing the syrup may be regarded as insoluble in water; its presence in the syrup is therefore due to the acids, which dissolve a corresponding part of it forming magnesium salts. The determination of the quantity of magnesium found present in *any* sample of syrup of Tolu, that was shaken after addition of water with magnesium carbonate, and afterwards filtered, will certainly furnish a

good means for finding the approximate amount of the acids present. The above experiments prove, I think, evidently, that the formula, as given by the new Pharmacopœia, for making syrup of Tulu is by far the best. Every apothecary will do well to follow the same, and not allow the substitution of an almost worthless syrup, the syrup of the old Pharmacopœia.

Cleveland, O., June, 1884.

SYRUP OF HYPOPHOSPHITES WITH IRON.

By Charles D. Randall.

In addition to the perfect stability, one of the chief qualities which characterizes the ferric from the ferrous salts, is the more agreeable taste of the former especially when existing in combination with an organic acid. Syrup of hypophosphites which was admitted to the list of preparations in the last revision of the pharmacopœia when made by the process there ordered contains to the fluid drachm about three grains of calcium hypophosphite and one grain each of the corresponding salts of sodium and potassium. The tendency of many of the soluble iron salts to precipitate when in the presence of the hypophosphites, has caused much trouble in the selection of a suitable salt without this property. Finally, after the subject was much discussed, ferrous lactate was selected as being the least objectionable, and is ordered in the preparation of the syrup with iron, in the proportion of ninety-six grains to the pint.

According to the pharmacopœia ferric hypophosphite is soluble in a solution of sodium citrate forming a green liquid. It is found by direct experiment that one equivalent of the hypophosphite requires one of the citrate for complete solution. This solution on contentration is shown to contain a mixture of crystals of sodium hypophosphite and an amorphous compound. The same mixture may be obtained by the inverse process—the union in solution of one equivalent of ferric citrate and three equivalents of sodium hypophosphite. If, however, one equivalent of ferric citrate be treated in solution with one equivalent of sodium hypophosphite an apple green solution results, containing an amorphous compound which may be represented thus:

$$\begin{matrix} Fe - Py \\ \| \\ Ci - Na. \end{matrix} \qquad (1)$$

Py being the symbol for the radical of hypophosphorous acid and Ci the symbol for the radical of citric acid.

By careful evaporation the liquid may be reduced to a syrupy consistence, and after pouring on a glass or porcelain tile the product may be obtained in thin soluble scales having an acidulous taste. But if one equivalent of ferric citrate be treated in solution with two equivalents of sodium hypophosphite, a somewhat lighter green solution than the foregoing results containing a very soluble amorphous compound, which though deliquescent may be obtained in scales and is represented thus:

$$\begin{matrix} Fe = Py_2 \\ | \\ Ci = Na_2 \end{matrix} \qquad (2)$$

It is also found by experiment that ferric hypophosphite is soluble in potassium citrate, each equivalent of the hypophosphite requiring an equivalent of the citrate for solution. This solution is shown on evaporating to contain a mixture of crystals of potassium hypophosphite and a green colored crystalline compound. This mixture may be obtained by the inverse process, treating a solution of one equivalent of ferric citrate with three equivalents of potassium hypophosphite. But if one equivalent of ferric citrate be dissolved in a solution of one equivalent of potassium hypophosphite the solution becomes olive green in color, and contains a non-deliquescent, but very soluble scale compound which is represented thus:

$$\begin{matrix} Fe - Py \\ \| \\ Ci - K. \end{matrix} \qquad (3)$$

If one equivalent of ferric citrate be treated in solution with two equivalents of potassium hypophosphite, an olive green crystalline compound is formed which though quite soluble is not as freely so as the last. This crystalline compound may be represented thus:

$$\begin{matrix} Fe = Py_2 \\ | \\ Ci = K_2 \end{matrix} \qquad (4)$$

Again, if one equivalent of ferric citrate be united with one equivalent of calcium hypophosphite, the resulting grass-green solution on concentration yields an amorphous compound, capable of being scaled and is represented by the formula:

$$\begin{array}{l} Fe - Py_2 \\ \| \quad\quad | \\ Ci - Ca \end{array} \qquad (5)$$

But if one equivalent of ferric citrate be treated in solution with two equivalents of calcium hypophosphite, the solution contains a grass-green amorphous compound, which may be obtained in scales and is represented thus:

$$\begin{array}{l} Ca - Py_2 \\ | \quad\quad | \\ Ci - Fe \\ | \quad\quad | \\ Ca - Py_2 \end{array} \qquad (6)$$

It will be seen from the foregoing results that the compounds represented by the first, third and fifth constitutional formulas cannot exist in solution with a free hypophosphite as the inevitable result will be, the formation of the compounds represented by the second, fourth and sixth formulas, respectively. It is also found that if a hypophosphite be added to a solution of either of the latter compounds, chemical union does not take place and the solution on evaporation will deposit the hypophosphite in crystals. This reaction will explain the formation of crystals of sodium hypophosphite in addition to the amorphous compound on dissolving one equivalent of ferric hypophosphite in a solution of one equivalent of sodium citrate; and the similar reaction attendant on the use of potassium citrate.

It is evident, therefore, that if ferric citrate be dissolved in a solution of an excess of the hypophosphites of calcium, sodium and potassium, one or more, perhaps all of the compounds represented by the second, fourth and sixth graphic formulas will be formed. The absolute stability and free solubility of these compounds, even in the presence of a large excess of free hypophosphites, and the fine green color of the solution consequent on their presence, are certainly sufficiently good reasons for the recommendation of the use of ferric citrate in the preparation of syrup of hypophosphite with iron.

In addition to the process ordered in the pharmacopœia for the preparation of syrup of hypophosphites which consists merely in solution, other methods are in vogue, which depend on double decomposition, including the so-called sulphate and carbonate processes.

Comments on the process ordered in the pharmacopœia are un-

necessary. The sulphate process may well be passed by on account of the impurity of the product, consequent on the solubility of calcium sulphate. The carbonates of sodium and potassium, because of their indefiniteness, the impurities they always contain and the bulkiness of the resulting calcium carbonate may well be replaced by the corresponding bicarbonates which are definite and far less liable to contamination. By employing the bicarbonates calcium bicarbonate is momentarily formed, and on being decomposed the resulting carbonate is dense and crystalline, thereby lessening the liability to loss of the liquid by absorption as well as facilitating filtration. When a moderately dilute solution of calcium hypophosphite is mixed with a solution of sodium bicarbonate no decomposition takes place. Even after standing several hours the liquid remains clear and retains its alkalinity; but when heated a few minutes the calcium carbonate is precipitated. It is a noticeable fact that under similar conditions potassium bicarbonate parts with its carbonic acid much more readily than the sodium salt does; the solution is at first clear, but soon deposits the calcium carbonate. It is therefore necessary in order to insure the complete decomposition of the sodium bicarbonate to employ a saturated solution of calcium hypophosphite. It is also necessary to heat the solution until action has entirely ceased before adding the potassium bicarbonate, which readily and rapidly decomposes.

The composition of the preparation made by the following formula is almost identical with that made by the process ordered in the pharmacopœia, each fluid drachm containing three grains of calcium hypophosphite and one grain each of the hypophosphites of sodium and potassium, and is sufficiently palatable without the aid of flavoring. The preparation contains the same amount of metallic iron as the pharmacopœia orders.

Calcium hypophosphite	554 parts	(or 591 grains).	
Sodium bicarbonate	95 "	(or 101	"
Potassium bicarbonate	115 "	(or 123	"
Ferric citrate	85 "	(or 91	"
Sugar, powdered	4,050 "	(or 9 troy ounces.	
Water, a sufficient quantity to make	10,000 parts	(or 16 fluid ounces).	

Dissolve the calcium hypophosphite previously reduced to a fine powder in 3,500 parts (or 8 fluid ounces) of water with the aid of heat, and add to the solution the sodium bicarbonate, continuing the heat until action has entirely ceased. After removing the solution from the

heat add the potassium bicarbonate in small portions waiting after each addition until effervescence has ceased before adding more. When action has entirely ceased filter the liquid through paper. After the liquid has ceased to drop add enough water through the filter to make the filtrate weigh 5,850 parts (or measure 10 fluid ounces.) In 1,200 parts (or 2 fluid ounces) of this liquid dissolve the ferric citrate with the aid of heat, and add the solution to the balance of the liquid. In this solution dissolve the sugar with or without the aid of heat and filter through paper, adding through the filter enough water to make the completed syrup weigh 10,000 parts (or measure 16 fluid ounces).

Detroit, Mich., May 30, 1884.

BAYCURU ROOT.

By Frederick Augustus Dalpe, Ph.G.

From an Inaugural Essay.

Baycuru is the vernacular name given to a plant, indigenous to Brazil, natural order, Plumbaginaceæ, and probably derived from the genus Statice. Mr. E. M. Holmes, London, believes it to be Statice brasiliensis. Although the Plumbaginaceæ do not generally inhabit tropical countries, some do exist there, and Dr. Symes gives some further information in regard to the origin of the plant. "It grows on the shores of the Rio Grande, and imbeds itself more or less in the sand, a number of radical leaves rising from above, and being some five to seven inches in length, by one and a half to two inches in breadth. The flower resembles that of the London pride (Saxifraga serratifolia). The whole plant is sometimes covered by the sea, for days and even weeks at a time, dependent on the direction of the winds, there being no tides in that locality. The natives have an unlimited amount of faith in its virtues as an astringent and discutient remedy, in all kinds of enlargements and glandular swellings; externally as a fomentation, and frequently as a vapor. It is also prescribed by the resident physicians, not as a specific, for Dr. Landell has found it to fail utterly, but as a rule it is reliable, both externally and internally, and forms a valuable astringent gargle. The root is used both in the fresh and dry states." As seen in commerce the root is subcylindrical, from six to eight inches in length, and from a half to an inch in width. It has a blackish brown bark externally, is quite

knotty and very rough from minute transverse fissures, and also from the removal of the cork in some places. There are also numerous depressions, probably due to shrinkage. For these reasons the root has rather a granular appearance externally. Internally it is reddish brown, and in a section cut transversely shows a rather thick bark, prominent wood-wedges, forming a circle with alternate layers of medullary tissue. The pith occupies about one-fourth of the whole diameter, and shows a few compact cells in its tissue; fracture rough, taste astringent.

Under the microscope the ordinary tissues of the dicotyledonous plants are seen. On a transverse section are seen, first the corky envelope, then the cellular envelope, consisting of six or eight layers of cells; to this is connected the liber or inner layer of bast tissue. The cambium layer follows. The wood appears on the transverse section pentangular. The medullary rays are much broader than the adjoining wood bundles. The shape of the cells of the meditullium varies from irregular quadrangular to pentangular. Air passages are also visible within the wood bundles. On the longitudinal section the elongated wood cells are noticeable, as also cells of the medullary rays. The most characteristic microscopical feature, however, is what appears to be sclerogen cells resulting from secondary deposits. In some cases they seem to be composed of a group of cells and are crystalline in appearance. They are found in the pith and in the inner bark.

The material for the following analysis was kindly furnished by Messrs. Parke, Davis & Co. The plan of analysis, essentially that of Mr. H. B. Parsons, was as follows:

Moisture.—6·48 Gm. of the finely powdered drug were dried in a suitable vessel at a temperature of about 90°C. until it ceased to lose weight. 5·93 Gm. remained, showing a loss equivalent to 8·5 per cent. of the drug.

Ash.—3 Gm. of the drug by gradual incineration, in a weighed porcelain crucible, yielded an ash weighing ·290 Gm., equivalent to 9·66 per cent. of the drug, and containing potassium, magnesium, sodium, and calcium, in the form of sulphates, phosphates, and chlorides, principally sodium chloride.

Benzol Extract.—100 Gm. of the finely powdered drug were placed in a suitable percolator, and after saturating the powder with a portion of the menstrum, and closing tightly, it was allowed to macerate for

three days; at the expiration of this time the percolation was allowed to proceed until the drug was completely exhausted. The percolate measured 296 Cc., and on evaporation yielded an extract weighing ·388 Gm., equivalent to ·388 per cent. of the drug. The extract was soft, of a dark green color, and consisted of a soft resin, a trace of wax and coloring matter. It was treated with warm water, filtered, and cooled. A portion of the filtrate tested by Mayer's solution, phosphomolybdic acid, platinic chloride, and other reagents for alkaloids gave negative results. Another portion boiled with dilute hydrochloric acid, and then neutralized with potassa, gave negative result with Fehling's solution, as a test for glucosides.

Alcohol Extract.—The drug remaining after treatment with benzol was dried, and after maceration exhausted with 80 per cent. alcohol. The percolate measured 620 Cc. An aliquot portion yielded an extract equivalent to 16·4 Gm. of the whole, or 16·4 per cent. of the drug. The extract was treated with water, and a portion of the filtrate was estimated for tannin with a freshly prepared solution of gelatin and alum. The weight of the tanno-gelatin precipitate was equivalent to 27 Gm. of the whole, and estimating 45 per cent. of this as tannin, shows a net result of 12·15 per cent. This tannin produced a green color with iron salts, was readily precipitable with solution of morphine and tartrate of antimony and potassium, in each case a white precipitate forming. The filtrate recovered from the tannin estimate was acidulated with sulphuric acid, an equal volume of alcohol added, allowed to stand for a time, filtered, washed, evaporated clear of all alcohol, and the acid solution tested for alkaloids and glucosides, with negative results for the latter. With Mayer's solution and phosphomolybdic acid precipitates were obtained. The remaining acid solution was then neutralized with ammonia, and the resulting precipitate shaken with ether in a test tube. The etherial solution was filtered, evaporated to a small quantity, and failing to show any crystalline products, after standing for a few hours, the evaporation was continued to dryness on a watch-glass. The result, as seen under the microscope, was small feathery crystals. Several efforts were made to isolate an additional quantity of these crystals, and the following process proved successful: An alcoholic tincture was evaporated to a syrupy consistence, potassa added, and the whole shaken with chloroform. The chloroformic solution was evaporated, the residue treated with a weak acid, filtered, precipitated by ammonia, treated with ether and then

with chloroform. The crystals obtained in both cases are completely dissipated on ignition, and gave a red color with sulphuric acid, which disappeared on heating, and left a tarry-colored liquid remaining. From these evidences I take this principle to be an alkaloid, for which I propose the name *baycurine.*

The portion of the alcoholic extract insoluble in water, was found to be principally resin. A separate investigation of the resinous bodies was conducted as follows: An aliquot portion of an alcoholic fluid extract, made from another portion of the drug, was poured into water and allowed to stand for a short time, when two resins were observed, one lighter, the other heavier than water. Their respective weights were in the proportion of ·5 to 1·5, and together yielded an amount equivalent to 1·66 per cent. of the drug. The lighter resin was partly soluble in ether and alcohol, and readily soluble in cold solution of potassa. The heavier resin was sparingly soluble in alcohol, soluble in ether, partly soluble in cold solution of potassa, entirely soluble in hot solution of the same. Both resins were precipitated by normal and by subacetate of lead. Their solutions were amber-colored, and in each the color was immediately discharged on the addition of mineral acids.

Cold Water Extract.—The remainder of drug left after the alcohol treatment was dried, and then macerated with water. The filtrate was wine-colored, and a portion yielded an extract equivalent to 3·66 per cent. of the drug, and was found to be gum principally, and to be precipitated by strong alcohol. No albumen was present.

Boiling Water.—The drug left from the previous treatment was boiled with water for eight hours; the volume of water was kept unchanged. The decoction was dark colored, had a disagreeable odor, and yielded an extract equivalent to 9·39 Gm. of the whole, or 9·39 pea cent. of the drug. Fehling's test proved the presence of glucose. Gum was found. Negative results were obtained for starch by the usual tests.

Volatile Principles.—150 Gm. of the powdered drug were placed in a retort and macerated for some days with water, then distilled. The distillate was neutral, dark colored, astringent, and possessed a very strong, disagreeable odor, so much so that it permeated the whole building in which the operation was conducted. On the surface of the distillate was found a trace of volatile oil, but not in sufficient amount

to be collected and examined. The distillate tested for alkaloids gave negative result.

The residue in the retort was then treated with potassa and water, and after standing for some days, was again subjected to distillation. The distillate was lighter in color, not so astringent (after neutralization), and the odor was less penetrating and not as disagreeable as the first distillate. What odor it possessed entirely disappeared on allowing the distillate to stand exposed to the air.

SUMMARY.

1. Moisture.....8·5 per cent.
2. Ash.....9·66 per cent. sulphates, chlorides and phosphates of sodium, potassium, magnesium and calcium.
3. Benzol extract.....·388 per cent. resin, wax and coloring matter.
4. Alcoholic extract.....16·4 per cent. alkaloid, tannin (12·15 per cent.), Resin (1·66 per cent.)
5. Aqueous extracts... } Infusion 8·66 per cent. gum. Decoction 9·39 per cent. glucose, gum.
6. Volatile principle.....Volatile oil (trace).

Crystals of Potassium Nitrate obtained from the juice of Plants.—Perfect yellowish crystals of potassium nitrate up to 10 millimeters long were found in extractum Cardui benedicti (the solid extract of Cnicus benedictus, *Gaertner*). They show the following combinations: $\infty P . \infty \breve{P}\infty . \breve{P}\infty . 2\breve{P}\infty$ and sometimes P. Crystals of potassium nitrate separated also from an extract, made (by means of alcohol) from the root of Oenothera biennis, *Lin.;* they have the following planes: $\infty P . \infty\breve{P}\infty . 2\breve{P}\infty$.

EDO CLAASSEN.

Cleveland, June, 1884.

HYDROBROMIC ACID must be used in much larger doses than has been customary if any benefit is to be derived from it. Such is the opinion of Dr. H. C. Wood ("Med. News," February 23), who has been using this drug recently in epileptic cases. He found in three instances that half ounce doses of the officinal hydrobromic acid was much more effectual than equivalent doses of bromide of sodium, or potassium, and not nearly so liable to produce symptoms of bromism. He gives the acid after meals, with syrup, and diluted with half a pint of water.—*Weekly Med. Review*, March 1.

ANALYSIS OF BARLEY.

By Frank X. Moerk, Ph.G.

From an Inaugural Essay.

Best Canada barley was reduced to a fine powder and treated according to the outline given by Mr. H. B. Parsons ("Amer. Jour. Phar., 1880," p. 210).

Moisture.—5 Gm. of the powder were placed in a weighed porcelain crucible and dried in a current of hot air at 110° C. until it ceased to lose weight. Loss 0·584 Gm., or 11·68 per cent.

Ash.—5 Gm. were ignited at a low-red heat until all of the carbon was consumed. The ash amounted to 0·134 Gm., or 2·68 per cent. Of this ash 0·061 Gm. was soluble in water; 0·044 Gm. in hydrochloric acid; 0·017 Gm. in solution of soda; and 0·012 Gm. was insoluble.

Nitrogen Estimation.—2 Gm. of the barley were mixed in a mortar with sufficient soda-lime to fill two-thirds of a 24-inch combustion tube. A small quantity of soda-lime was first placed in the tube, then the above mixture, and lastly, enough soda-lime to fill the tube to within one inch of the end. This last quantity was used to rinse the mortar. For the purpose of collecting and estimating the nitrogen which is given off, in combination with hydrogen, as ammonia, two solutions were prepared: No. I, an aqueous solution of hydrogen sulphate containing 4·9 Gm. H_2SO_4 in 100 Cc.; No. II, an alkaline solution containing 0·08 Gm. sodium hydrate in 100 Cc. The equivalents of hydrogen sulphate, sodium hydrate, hydrogen nitride and nitrogen are 49, 40, 17 and 14, respectively. As 1 Cc. No. I contains 0·049 Gm. hydrogen sulphate, it requires 0·04 Gm. sodium hydrate —50 Cc. No. II—or 0·17 Gm. hydrogen nitride to neutralize it. As every 0·017 Gm. hydrogen nitride contains 0·014 Gm. nitrogen, by multiplying the number of Cc. neutralized by hydrogen nitride by 0·014 Gm. there is obtained the amount of nitrogen. 10 Cc. of No. I having been measured into the nitrogen bulbs, air-tight connections were made between these and the combustion tube. The latter was placed in a charcoal furnace and fire applied to the interior extremity of the tube and gradually moved towards the other end. When the whole tube was red-hot and gas ceased to escape, the point of the tube was broken and a little air

drawn through to displace remaining gas. The acid solution was now taken out of the bulbs and the latter thoroughly rinsed, the water used being added to the solution. A few drops of solution of litmus were added and the liquid carefully neutralized with No. II. Of 500 Cc. of No. II required to neutralize 10 Cc. of No. I, 148·5 Cc. had been replaced by the evolved ammonia; in other words, 2·97 Cc. No. I were neutralized before any of No. II had been added. 2·97 multiplied by 0·014 equals 0·04158 Gm. nitrogen in 2 Gm. barley. This, multiplied by 6·25 yields in 2 Gm. of barley 0·25987 Gm., or 12·99 per cent. of proteids.

Benzin Extract.—10 Gm. of finely powdered barley placed in a closely covered percolator, were macerated with 30 Cc. benzin for four hours. It was then allowed to percolate, and enough benzin was added to displace the quantity retained by the drug. The process was repeated three times and insured complete exhaustion of the drug, as, when a few drops of the last percolate were evaporated on platinum foil, no residue was obtained. This extract was evaporated on a water-bath until all of the benzin was volatilized. Weight of the extract 0·494 Gm. A little water was added to the extract and this was again evaporated on a water-bath, whereby a loss of 0·069 Gm. was incurred which was ascribed to volatile oil. Of the remainder of the extract, water dissolved 0·03 Gm. having an acid reaction; alcohol dissolved 0·245 Gm. of which 0·145 Gm. was soluble in alkali solution and precipitated again on addition of mineral acids; the portion insoluble in the alkali was an oily liquid and floated on water; 0·15 Gm. of the extract was insoluble in water or alcohol. The portion soluble in alcohol is also soluble in ether, chloroform and disulphide of carbon.

Alcohol Extract.—The barley treated with benzin was dried at a moderate heat and exhausted with sufficient (80 per cent.) alcohol to make 200 Cc. of percolate, which had an acid reaction. 20 Cc. were used for finding the total extract —0·5 Gm.— and ash —0·04 Gm.— Of this extract —0·36 Gm.— was soluble in water. The insoluble portion —0·14 Gm. was soluble in fixed alkalies, and consisted of proteids. 40 Cc. were evaporated to dryness on a water-bath; the residue was exhausted with boiling water and diluted to 40 Cc. This solution boiled with Fehling's solution reduced it, showing that sugar or an allied body was present.

120 Cc. were carefully neutralized with sodium hydrate and evapo-

rated to dryness. The soluble parts of the residue were extracted with sufficient boiling water to make 30 Cc. When tested with Fehling's solution it failed to reduce it, showing that no reducing sugar was present, also that the acid neutralized by sodium hydrate was capable of forming a reducing sugar by acting on an unreducable sugar or a closely allied body.

The remaining percolate —25 Cc.— was boiled for one hour with five drops of hydrochloric acid, water being added, from time to time, to preserve this measure; it was then neutralized with sodium carbonate and tested with Fehling's solution and Sachsse's test, both were reduced. By using these two solutions, we can estimate the quantity and kind of a number of reducing sugars and bodies forming reducing sugars by being boiled with acids. For instance, cane-sugar and dextrin belong to the latter class, but cane-sugar forms invert-sugar whilst the latter forms glucose, and these two products have different reducing powers with Sachsse's test, but the same with Fehling's solution, so that they can be estimated even in presence of each other. Glucose, maltose, lactose, etc., are reducing sugars and therefore are not present in the above extract. To establish the identity of the body or bodies present in the alcohol extract, a solution was prepared from the alcoholic extract of 20 Gm. barley exactly as the one mentioned before. This was concentrated to 40 Cc. and tested with Sachsse's test and Fehling's solution.

10 Cc. Fehling's solution and 30 Cc. water were brought to the boiling point in a porcelain capsule, and the above solution gradually added until all the cupric oxide was reduced. This point was found by occasionally testing for copper, by taking a few drops from the dish, acidifying with acetic acid and adding a few drops of a solution of potassium ferrocyanide. As long as there is copper in solution a reddish brown precipitate will show its presence. The quantity of the solution required to reduce 10 Cc. Fehling's solution was 9·33 Cc. As 10 Cc. of Fehling's solution are reduced by 0·05 Gm. sugar, $9{\cdot}33 : 0{\cdot}05 :: 40 : x = 0{\cdot}2144$ Gm. sugar in 20 Gm. barley.

40 Cc. Sachsse's test was boiled in a porcelain capsule, and the solution gradually added until all of the mercuric iodide—0·72 Gm.—was reduced to metallic mercury.

This point was found by occasionally testing a few drops taken from the capsule with a solution of potassium hydrate containing stannous oxide. If mercury is still in the solution, a black precipitate or a

brownish coloration is produced. It required 20 Cc. of the solution to reduce 40 C.c. of the test, therefore the solution was capable of reducing 80 Cc., or 1·44 Gm. mercuric iodide. It requires 0·1501 Gm. glucose, represented by x, to reduce 0·72 Gm. HgI_2, whilst of invert-sugar, represented by y, only 0·1072 Gm. is required. From these figures, the relative value of x is obtained as 4·79, and that of y as 6·71.

The amount of sugar estimated by Fehling's solution, and the amount of mercuric iodide reduced by the same quantity of the solution, give the data for estimating the amount of sugar or of sugar and dextrin present. First, the equations $x + y = 0{\cdot}2144$ and $479x + 671y = 1{\cdot}44$ are formed. By calculation it is found that $y = 0{\cdot}2144$ and $x = 0$, showing that invert sugar only is present. But this sugar was not present in the original extract, as that did not reduce the test solutions, so it must have been produced from cane sugar, by boiling with hydrochloric acid, or by the body which has an acid reaction.

1 mol. cane sugar—$C_{12}H_{22}O_{11}$, 342—on boiling with acids is changed to form 2 mol. invert-sugar—$C_6H_{12}O_6$, 180—by combining with H_2O. According to this, the 0·2144 Gm. invert-sugar is produced frm 0·204 Gm. cane-sugar, or 1·02 per cent.

Cold Water Extract.—The barley not dissolved by the alcohol was dried, and weighed 7·83 Gm. This was macerated, and percolated with cold water until exhausted. The percolate was concentrated to 40 Cc. and tested with Fehling's solution, which it failed to reduce. After boiling it for two hours with a liltle dilute sulphuric acid, neutralizing with sodium carbonate, and again testing, it reduced the test solution, showing the presence of 0·206 Gm. sugar. The whole extract was capable of reducing 0·987 Gm. HgI_2, $x + y = 0{\cdot}206$ and $4{\cdot}79x + 6{\cdot}71y = 0{\cdot}987$, showing that the sugar formed by boiling with the acid consisted wholly of glucose, and this was produced from dextrin. Dextrin—$C_6H_{10}O_5$, 162—when boiled with dilute acids, combines with H_2O to form 1 mol. glucose—$C_6H_{12}O_6$, 180—so that the amount of glucose was formed from 0·185 Gm. of dextrin.

The remainder of the barley when dried weighed 7·438 Gm., and the extracted matter by water, amounting to 0·392 Gm., consisted of dextrin, proteids and ash.

Acid Extract.—The portion not dissolved by the previous treatment was mixed with 200 Cc. water and 5 Cc. sulphuric acid, and boiled for eight hours, water to preserve this quantity being added occasion-

ally. It was thrown upon a filter and thoroughly washed with warm water, and then diluted to 600 Cc. This extract contained all the starch of the barley as glucose. Fehling's solution showed the presence of 6·293 Gm. of the sugar, and with Sachsse's test 30·186 Gm. HgI_2 were reduced. As starch and dextrin are isomers, the same change took place as was explained under the cold water extract. 180 : 6·293 :: 162 : $x = 5·664$ Gm., the amount of starch in 10 Gm. barley.

Weight of the insoluble portion, when dried, 1·664 Gm. Total acid extract, therefore, 5·774 Gm., and of acid extract not starch, 0·11 Gm.

Alkali Extract.—On boiling the above remainder for two hours with 100 Cc. of a 20 per cent. solution of sodium hydrate, filtering, and washing with sufficient water to remove the alkali, the residue after drying weighed 0·746 Gm., making the alkali extract 0·918 Gm., consisting of proteids and ash.

The residue, 0·746 Gm., consisted of crude fibre and ash. To find the amount of pure cellulose it was macerated for 24 hours in a solution of chlorinated soda, washed, dried and weighed. Weight, 0·744 Gm. The ash was estimated by igniting the above in a weighed crucible and weighing the portion not consumed. Ash, 0·024 Gm.; pure cellulose, 0·72 Gm.

On summing up the results of the different operations, the follow- is produced:

		Calculated as free from moisture.
Moisture	11·68	
Ash	2·68	3·03
Proteids	12·99	14·70
Fat, Resin, etc.	5·65	6·39
Volatile Oil	0·69	0·78
Cane-sugar	1·02	1·15
Dextrin	1·85	2·09
Starch	56·64	64·13
Cellulose	7·20	8·15
	100·40	100·42

CONTRIBUTION TO THE MORE EXACT KNOWLEDGE OF THE CHEMICAL NATURE OF STARCH-GRAINS.

By B. Brukner.

In 1856, Nägeli extracted a substance turned blue by iodine, and termed "granulose," from starch-grains, without, however, destroying their form. In 1859 Jessen found that on rubbing starch-grains with water a portion of the soluble starch was dissolved. Nasse, in 1866, gave the name amidulin to a soluble body obtained from starch-paste. Nägeli, in 1874, extracted by dilute hydrochloric acid a body essentially different from starch, which he called amylodextrin. The first object of the author is to determine the relation existing between these four bodies.

Amidulin.—Starch has generally been considered as insoluble in water. Jessen and Delffs, by rubbing starch with water, extracted a portion; this might, however, have been due to the conversion into starch-paste by the heat evolved in the crushing of the granules. W. Nägeli imbedded starch-grains, and then cut sections; the portions of the granules were turned blue by iodine, as also was, to some extent, the small quantity of water employed, and hence a portion must have gone into solution. By rubbing dry starch granules, they may be broken, and, if subsequently treated by water and filtered, they give a clear solution turned blue by iodine. But, on allowing wheaten starch to digest with water for three weeks, filtering, evaporating to one-fifth, and testing with iodine, no blue coloration was obtained; hence it is impossible to extract the inner and soluble starch with water until the outer membrane is either changed or broken: the character of the solution is that of a micellar solution; it is not capable of diffusion. The substance soluble in cold water and colored blue by iodine, the amidulin of Nasse and the granulose of Nägeli, are identical.

Starch-paste.—Schimper and Nägeli are not agreed as to the distinction between swollen starch and starch-paste. Between these two states there is no sharp distinction; thus at 46° potato-starch swells distinctly; at 59° it begins to lose its form; and at 62·5° it is converted into a paste, and shows no trace of the original form. After discussing Nägeli's micellar theory, viz., that the smallest particles of starch and similar substances consist not of molecules, but of larger

groups, *i. e.*, micellæ, which, owing to their comparatively slow movements, due to their greater size and weight, easily unite into micellar clusters, the author concludes that swollen starch and starch-paste differ in nothing but the aggregate condition of their micellæ; they differ therefore physically but not chemically, and accordingly starch-paste, amidulin and granulose are identical.

Erythrogranulose.—Erythrogranulose and erythrodextrin are the names given to two bodies colored red by iodine (Brücke). By digesting starch solution with diastase, and testing portions from time to time with iodine and with tannin solution, it was shown that so long as iodine produced a blue coloration, tannin produced a precipitate, but with a red coloration no precipitate was formed, nor under these conditions was a precipitate produced by adding hydrochloric acid; hence the red coloration is due to the presence of dextrin. If very dilute iodine be added to starch-granules (or paste) a red color is first produced; this is due to the presence of dextrin (erythrodextrin) and its greater solubility in water.

Amylodextrin.—W. Nägeli states that soluble starch is distinguished from amylodextrin by being precipitated from solution by tannin and by lead acetate, and further that freshly precipitated starch is insoluble in water, whilst freshly precipitated amylodextrin is soluble. None of these differences can be confirmed. Further, amylodextrin does not, like starch, swell up with an alkaline solution, but simply dissolves; this, however, is not a distinctive test, since precipitated starch behaves exactly like amylodextrin; amylodextrin is tinted by organic matter just as starch is. It is also stated that Trommer's copper test is not reduced by amidulin, but is by amylodextrin; but it has been shown that the starch-grains themselves contain dextrin, and further, during the progress of the test, the starch becomes converted into dextrin and into sugars, and, still more important, dextrin is formed during the preparation of amylodextrin.

The author has been quite unable to confirm the statement as to the crystalline nature of amylodextrin. Amidulin and amylodextrin are identical. That amydulin—a body not capable of diffusion, can be extracted from starch-grains by dilute acid, is explained by the action of the acid on the micellar aggregates.

The Iodine Reaction.—The so-called iodide of starch is no chemical compound; it has been stated to be decomposed when heated; this depends on the affinity of warm water for iodine being greater than

that of cold water; and if this greater absorptive power be satisfied by addition of more iodine, then the blue color is not destroyed even by boiling. The author considers the blue color to be simply due to the solution of iodine in potato-starch, just as violet and brown colors are obtained on solution in chloroform and water respectively. Potato- and arum-starch yield blue colorations, wheat- and rice-starch yield violet, but after boiling they also are turned blue by iodine. Starch-grains have a greater attraction for iodine than unorganized starch; thus a cold clear solution prepared from crushed starch-grains and colored blue by iodine, is completely decolorized by adding whole starch-grains. Similarly, it is shown that starch-grains attract iodine more energetically than dextrin, the red solution being decolorized, and the starch-grains turning blue.

In conclusion, soluble starch, starch-paste, granulose, amidulin and amylodextrin are identical, *i. e.*, give identical reactions, as also are erythrogranulose, erythrodextrin and dextrin.—*Jour. Chem. Soc.*, May, 1884, p. 575, from *Monatsh. Chem.*, vol. 4.

CONSTITUENTS OF WHITE AGARIC.

By E. Jahns.

Although the larch agaric (*Polyporus officinalis*) has been investigated by more than one chemist, conflicting statements concerning its constituents still exist. The author, with the view of clearing up the question, has re-investigated this plant. By extraction with hot strong alcohol it yielded about 18 per cent. of a crystalline acid melting at about 139°, and easily soluble in alcohol, glacial acetic acid, and turpentine; less soluble in ether, and nearly insoluble in chloroform, benzene and cold water. The acid is dibasic, forming normal salts with the alkali metals, which are easily soluble in water, and acid salts which are only slightly soluble; with the majority of the metals, it forms insoluble salts, which are precipitated in the amorphous state from aqueous solutions. Analysis showed that *agaricic acid* was a homologue of malic acid, represented by the formula $C_{16}H_{30}O_5H_2O$. On oxidation with nitric acid, it is converted into succinic and butyric acids. The principal salts are described in the paper. This acid is identical with the "agaricic acid" of Fleury, the "laricin" of Martius; and the substances named by Schoonbroodt "agaricin" and "pseudo-wax" by Trommsdorff are probably the same acid in an

impure state. The original alcoholic extract of the fungus also yields a substance which crystallizes in needles from a solution in absolute alcohol. It is insoluble in water, and nearly so in ether, chloroform and cold alcohol, but dissolves in potash solution. It melts at about 272°, and sublimes in white needles. This substance, which is probably an alcohol, exists to the extent of about 5 per cent. in the plant. The alcoholic mother-liquors from this substance contain a white amorphous body, which is deposited in a colloidal form from its solution in chloroform. It appears to be an acid, and occurs to the extent of about 4 per cent. in the fungus. Finally a red amorphous resin was obtained from the original alcoholic extract, in which it was very soluble. This is the bitter purgative constituent of the fungus, and is present to the extent of about 30 per cent.—*Jour. Chem. Soc.*, March, 1884, p. 353, from *Arch. Pharm.*, vol. 21.

CODEINE HYDROBROMIDE.

By D. B. Dott.

Codeine is the strongest of the opium bases, replacing all the others in solution of their salts. Yet probably for more than one reason, the salts of codeine are not much in demand, the alkaloid itself being more generally used. As the hydrobromide is sometimes required, I thought that a note of its principal properties might be of some interest, especially as the salt has not been previously described, at least so far as I have observed.

Codeine hydrobromide crystallizes from an aqueous solution in radiate tufts of four-sided prisms. The solubility in water was determined by digestion at a temperature below 60°F. for twenty-four hours, then at 60° for two hours, when portions of the solution were weighed and evaporated to dryness on a water-bath.

a. 165 grs. solution left 1·93 grs. = 1·97 grs. 2 — hydrate.

$$\frac{165 - 1{\cdot}97}{1{\cdot}97} = 82{\cdot}75.$$

b. 144·25 grs. left 1·70 = 1·73 grs. 2 — hydrate.

$$\frac{144{\cdot}25 - 1{\cdot}73}{1{\cdot}73} = 82{\cdot}38.$$

The solubility in water at 60° F. is, therefore approximately 1 in 82·5.

With the heat of a water-bath 8·04 grs. of the air-dry salt lost 0·17 gr. = 2·11 per cent. $C_{18}H_{21}NO_3.HBr.2H_2O = 2·16$ per cent. for $\frac{1}{2}$ H_2O. In the air-bath at 115° C. 5·74 grs. lost 0·485 gr. = 8·44 per cent. $C_{18}H_{21}NO_3.HBr.2H_2O = 8·65$ per cent. for $2H_2O$. It is, therefore, evident that the hydrobromide like the hydrochloride loses a fourth part of its combined water at the temperature of the water-bath, and the remainder at some temperature above 100°. But we must not deal in fractions of molecules, so we ought to write the formula $(C_{18}H_{21}NO_3.HBr)_2 4H_2O$, or more accurately (having in view the researches of Dr. Wright), $C_{36}H_{42}N_2O_6.2HBr.4H_2O$. We may, of course, use the empirical formula when more convenient, just as we sometimes write the erroneous expression $FeCl_3$ instead of Fe_2Cl_6. —*Pharm. Jour. and Trans.*, May, 17, 1884, p. 917.

ALKALOIDS OF ANGUSTURA BARK.

By Koerner and C. Böhringer.

In this preliminary notice the authors, after some historical details as to the introduction of the bark, state that it contains aromatic substances and several alkaloids, the amount of the latter varying in different specimens from 0·8 to 1 per cent. The alkaloids are mostly in the free state, and may be extracted directly from the bark by means of ether. After the ethereal extract has been washed with dilute potash solution, the addition of oxalic acid or dilute sulphuric acid gives a yellow crystalline precipitate of the corresponding salt of one of the alkaloids, *cusparine*, whilst other alkaloidal salts remain in solution.

The precipitated cusparine salt is moderately soluble in boiling alcohol, and, on cooling, crystallizes out in slender needles of a magnificent greenish yellow; this color is not removed by repeated crystallization, or by treatment with animal charcoal, and other salts of the alkaloid, obtained from the yellow precipitate by decomposition, are also intensely yellow. If, however, the free cusparine, $C_{19}H_{17}NO_3$, obtained from these colored salts, is crystallized several times from light petroleum, and then reconverted into the salt, this is found to be colorless. The author has been unable to ascertain the cause of this yellow coloration. The alkaloid crystallizes from light petroleum in tufts of slender needles melting at 92°; it is moderately soluble in ether, more readily in alcohol. The sulphate, oxalate and hydrochlo-

ride of the base are but sparingly soluble in water; the acetate is much more soluble, but the solution is decomposed if largely diluted; the tartrate dissolves readily. The platinochloride was obtained as an orange-yellow crystalline precipitate.

When treated with potassium hydroxide, cusparine splits up, yielding a new alkaloid and the potassium salt of an acid which seems to be an aromatic derivative; the acid is sparingly soluble and crystallizes readily. The alkaloid crystallizes from alcohol, in which it is very sparingly soluble, in minute, very brilliant, colorless needles; it decomposes at 250° without melting. An attempt to decompose the cusparine in a similar manner by the action of hydrochloric acid failed, as it began to carbonize even at 100°.

In the mother-liquors from which the cusparine was originally precipitated as sulphate or oxalate, another alkaloid is found, to which the authors have given the name *galipeïne*, $C_{20}H_{21}NO_3$. The free base crystallizes from light petroleum in white needles melting at 115·5°. It may be obtained in well-formed transparent prisms from its solution in ether or alcohol. All the salts of this alkaloid are more soluble than those of cusparine; several of them are of a magnificent greenish yellow like uranium salts. The sulphate crystallizes in large prisms with 7 mols. H_2O, which it loses in part on exposure to the air; it melts at 15°, and at 100° undergoes decomposition, yielding the sulphate of another alkaloid and a crystalline nitrogenous substance which melts at 196°. The platinochloride crystallizes in prisms with a triangular base.

Besides cusparine and galipeïne, the authors have found another alkaloid which melts at 180°, and is very sparingly soluble in ether. It crystallizes from alcohol and furnishes salts, the solutions of which have a blue fluorescence.

The property these alkaloids have of being transformed into other alkaloids with simultaneous formation of acids, is interesting, and may throw some light on the constitution of vegetable alkaloids in general. —*Jour. Chem. Soc.*, March, 1884, p. 341, from *Gazzetta*, vol. 13.

NICOTINE AND ALCOHOL ANTIDOTAL TO STRYCHNINE.—Prof. Haughton, of Dublin, relates a case of strychnine poisoning which was treated by drop doses of nicotine in whisky punch every half hour. At the second dose the paroxyms became less violent and the muscles of the abdomen softer.—*Med. Annals.*

THE ESSENTIAL OILS OF BLUMEA LACERA, DC., AND SPHÆRANTHUS INDICUS, LINN.

By W. Dymock.

These two plants attract attention in India during the cold weather by their abundance on waste ground and in fields after the harvesting of the rice crop. The *Blumea* has a powerful camphoraceous odor, and *Sphæranthus indicus* a rose-like perfume.

B. lacera is a perennial plant, with obovate, deeply serrated leaves and yellow groundsel-like flowers, the whole plant being thickly clothed with long silky hairs. The natives of the Concan, near Bombay, call it *Nimúrdi*, and make use of it to drive away fleas and other insects. One hundred and fifty lbs. of the fresh herb in flower was submitted to distillation in the usual manner with water, and yielded about 2 ounces of a light yellow essential oil, having a specific gravity of 0·9144 at 80°F., and an extraordinary rotating power, 100 mm. turning the ray 66° to the left. Mr. D. S. Kemp, who made the observation, checked it by examining a 10 per cent. solution in alcohol, which gave 6·6.

This *Blumea* is of interest as the possible source of an insect powder. I am forwarding a supply of the plant and a specimen of the oil to Mr. Holmes for experiment and also for identification, as the genus is a difficult one.

Sphæranthus indicus is an annual with sessile, decurrent, obovate, bristly serrate, downy, glutinous leaves, and globular heads of purple flowers. It is a well-known Indian medicine, under the names of *Múndi, Gorakhmúndi, Munditika, Murmuria* and *Kottak-karandai*, and is reputed to be a general tonic, deobstruent, alterative and aphrodisiac. The distilled water is recommended for use and also the root. One hundred and fifty lbs. of the fresh herb was distilled with water in the usual manner and yielded a very deep sherry colored, viscid essential oil, very soluble in water, and clinging to the side of the vessel, so that only half an ounce could be collected. The oil does not appear to have any rotatory power, but it is difficult to examine on account of its opacity.—*Parm. Jour. and Trans.*, June, 7, 1884, p. 985.

Bombay, May 1, 1884.

SPIRITUS ÆTHERIS NITROSI: COMPOSITION IN RELATION TO DETERIORATION.[1]

By Petr Macewan.

"What this spirit is," says Professor Redwood,[2] "has hitherto eluded investigations; it contains nitrite of ethyl, aldehyde, and probably other compounds, but in what proportion it is extremely difficult to indicate, all that we can say is that it always contains the same proportion of the same ingredients."

Recognizing fully the difficulty here alluded to, it is with some hesitancy that I approach the subject, for though Professor Redwood made this statement about six years ago little has been done to increase our knowledge of the complex mixture, spiritus ætheris nitrosi. True, pharmaceutical literature published since then shows that it does not "always contain the same proportion of the same ingredients," and the reason why was very clearly shown in the discussion which followed Mr. Abraham's paper at the Southport meeting of the Pharmaceutical Conference. This paper is not intended to add to our knowledge of the composition; I can only consider it as a preliminary statement of the work which I have been enabled to do in the subject. Without entering, therefore, into the question of the "other compounds," I meanwhile propose to discuss the composition as related to deterioration; that is, the existence in the spirit of ethyl nitrite and aldehyde and the influence they exert in causing deterioration. Taking the official spirit as our standard we find that our opinion is fairly agreed as to ethyl nitrite and aldehyde being always present in it. Their presence can very readily be demonstrated, as by the tests which I show you.

Proportion of Ethyl Nitrite in the Spirit.—Were all the nitric acid ordered in the official process reacting with the alcohol *to form only ethyl nitrite* ($C_2H_5NO_2$), we should expect to find somewhat over 6·5 per cent. in the finished spirit; but in practice we find that the theoretical yield is not obtained, and only with extreme care can we obtain a product containing 4 per cent. of ethyl nitrite. There is really no authoritative standard to go upon, the Pharmacopœia tests being empirical, but Dr. Dupré, in a paper[3] read before the Society of Public Analysts,

[1] Read at an Evening Meeting of the North British Branch of the Pharmaceutical Society, March 19, 1884.

[2] "Pharm. Jour." [3], viii, 377.

[3] "Pharm. Jour." [3], x, 93.

stated that spirit containing 3 per cent. of ethyl nitrite fairly represented the B.P. preparation. This percentage is a fair one, and as Dr. Dupré's work has been the "guiding star" of public analysts, we may accept his standard, especially since the experience of practical pharmacists sufficiently justifies it. Mr. Symons having so recently shown ("Pharm. Jour.," Oct. 13, 1883) the quality of commercial spt. æther. nit., I have not attempted the collection of similar information. It was necessary, however, to determine the amount of ethyl nitrite present as deterioration proceeded, and for this purpose Eykman's method was adopted, others having proved uncertain. It will be seen from the table which I give further on that as high as 3·54 per cent. of ethyl nitrite was found, free nitrous acid not being included in the percentage.

The Aldehyde Content.—Aldehyde has generally been looked upon as an unavoidable contamination, and one of the objects aimed at by Professor Redwood in devising the official process was to minimize the yield of this compound. The percentage of it present in the spirit is variable, and as it is closely associated with ethyl nitrite in deterioration, I shall consider it in the paragraph on *development of acidity*. In the distillate of the Pharmacopœia process I have not found higher than 2 per cent. It may be stated that the method of estimation adopted was that devised by Dr. Thresh,[1] which is based on the formation of aldehyde resin with excess of caustic soda solution, the colored solution formed being diluted to the tint of a standard aldehyde resin solution, and compared as in nesslerizing. From 5 to 10 cc. of the spirit may be used. The method gives fairly constant results, and though they may be approximate, still they are much more constant than those given by Mr. Rimmington's method,[2] which depends on oxidation of the aldehyde with hydroxyl solution and subsequent titration with standard alkali. The weakness here is that the acidity produced depends on more than aldehyde.

These two bodies, ethyl nitrite and aldehyde, are the leading factors in determining the deterioration of spiritus ætheris nitrosi, another being their solvent, rectified spirit, a mixture of alcohol and water. The decomposition which results in the mixture of these three bodies is attended by at least three marked changes which can be physically and chemically determined:

[1] "Pharm. Jour." [3], ix, 409.
[2] "Pharm. Jour." [3], x, 41.

1st. Increase of specific gravity.

2d. Diminution of the volume of ethereal liquid separated by saturated chloride of calcium solution.

3d. Development of acidity.

The extent of these changes we shall consider in their order.

Increase of Specific Gravity.—In the following table I give results of observations. I. to V. are B.P. spirit made by myself or procured as such. VI. is spirit answering B.P. tests raised to ·850 with water, and VII. is the ·850 of London Pharmacopœia.

	Made.	When examined.	Sp. gr. 50° F.
I.	Not known.	May, 1883.	·848
I.	Not known.	March, 1884.	·853
II.	Not known.	May 1883.	·852
II.	Not known.	March, 1884.	·8576
III.	Nov., 1883.	March, 1884.	·852
IV.	Received Nov., 1883.	March, 1884.	·8516
V.	Feb. 14, 1884.	Feb. 14, 1884.	·846
V.	Feb. 14, 1884.	Feb. 21, 1884.	·850
V.	Feb. 14, 1884.	March, 7, 1884.	·8516
VI.	Feb. 15, 1884.	March 7, 1884.	·8536
VII.	Received Nov., 1883.	Feb. 14, 1884.	·856
VII.	Received Nov., 1883.	March 7, 1884.	·859

Diminution of Separation Volume.—In this I give the result of examination of two specimens of the B.P. spirit kept under different conditions, *α* in a well stoppered and almost full bottle, which was opened frequently, and *β* kept in a badly stoppered bottle, half full, and between the second and third observations the stopper was accidentally left out over a night.

α.	February 14.	2 p. c.	*β.*	February 14.	2 p. c.
	February 21.	1·75 p. c.		February 18.	1·33 p. c.
	March 7.	1·33 p. c.		February 21.	Nil.

It will be convenient to reserve remarks on these observations until we consider:

The Development of Acidity.—The free acids existing in the spirit are acetic and nitrous acids. It has been stated that nitric acid is also present, but the ordinary methods for determining the existence of

nitric acid in presence of the nitrous, are inapplicable in this case. It is questionable, however, if nitric acid can exist as such in presence of the readily oxidizable constituents of the spirit. I have therefore calculated the inorganic acid as nitrous acid (HNO_2).

The free acids were determined volumetrically,[1] semi-normal solution of soda was used, methyl orange being taken to indicate nitrous acid and phenolphthalein to indicate total acidity. The method is certainly not free from objection, the sources of error being (1) decomposition—that is, further acidity—of the spirit during the estimation, and (2) decomposition of the methyl orange by free nitrous acid. The first error can be limited by rapid manipulation, use of undiluted spirit and a small flask. The second is not so rapid in its action as to preclude indication, and by using the methyl orange externally as well as internally, the error is minimized. In the method we take 10 cc. of the spirit, which is put into a 50 cc. flask, in which a drop of phenolphthalein has previously been put, then two or three drops of methyl orange solution are put in. Before the estimation is commenced several spots of methyl orange solution are placed on a white plate, and a glass rod should be at hand. The standard solution is quickly but carefully dropped into the flask, and as soon as the red color of the methyl orange begins to fade, the glass rod should be dipped in and brought into contact with a methyl orange spot on the plate. If the spot assume a strong pink color, we have an indication that the nitrous acid is not quite neutralized, so the addition of standard solution is continued until the methyl orange spot becomes but feebly pink. The volume of standard solution used is noted, and the titration continued until the phenolphthalein indicates alkalinity. The first portion used is calculated for nitrous acid and the second for acetic acid.

In the following table the results of several observations are given in percentages, the proportion of ethyl nitrite and aldehyde (as far as determined) being also given. I. to IV. are B.B. spirit (α and β of the separation paragraph are II. and III.); VII. is B.P. raised to ·850, and the others are the ·850 of Lond. Phar.

Having before us these tabulated results of the effect of deterioration on the specific gravity, separation volume and acidity of the spirit, we may now discuss the causes of decomposition and deterioration.

[1] In Mr. Rimmington's method the spirit is unduly exposed to atmospheric influence and the action of water.

	Date or age.	HNO_2	$HC_2H_3O_2$.	$C_2H_5NO_2$.	C_2H_4O.
I.	May, 1883.	0·47	1·20	0·87	0·80
I.	March, 1883.	0·773	0·329	0·095	2·50
II.	One week.	0·215	0·206	3·54	0·85
II.	Two weeks.	0·257	0·247	.....	0·95
II.	Three weeks.	0·274	0·349	3·14	
III.	Two days.	.....	.....	2·01	0·80
III.	Four days.	0·24	0·216	.....	1·14
III.	One week.	0·322	0·246	1·24	2·00
IV.	One month.	0·247	0·411	1·93	1·67
V.	Four months.	0·161	0·288	3·53	1·5
VI.	Four months.	0·352	0·494	1·64	1·426
VII.	Four months.	0·418	0·206	0·92	2·5
VIII.	Four months.	0·194	0·247	0·22	0·2
IX.	As received.	0·188	0·42	.....	

Ethyl nitrite, it is well known, is a very volatile fluid, and if the spirit be stored in imperfectly closed bottles, considerable loss will result from evaporation. But this does not account for the specific gravity, for since ethyl nitrite is of greater density than spt. æther. nit., the loss by evaporation would tend to decrease rather than increase the density of the spirit. Although Dr. Dupré has stated (see paper quoted) that the acidity of the official spirit is not due to decomposition of ethyl nitrite, yet all pharmacists who have studied this subject have recognized the text-book statement, that the water contained in the rectified spirit used in the preparation reacts with the ethyl nitrite to form alcohol and nitrous acid. A further change takes place in which acetic acid is one of the products, and since the aqueous solutions of these acids are supernormal, they will tend to increase the specific gravity, and as ethyl nitrite disappears in their formation, the separation volume necessarily decreases. Independent of the reaction between water and ethyl nitrite another reaction takes place, in which acetic acid is formed. What is this reaction? Oxidation of aldehyde, is a natural reply, and to this oxidation the formation has generally been attributed. But it will be observed from the acidity table that aldehyde is an *increasing* rather than *decreasing factor*, as we should in these circumstances expect. This is particularly observable in the case

of III., which decomposed rapidly. Without denying that the formation of acetic acid is due in part to oxidation of aldehyde, it must be admitted that another explanation is required. Rapid decomposition is the result of atmospheric influence, and is analogous to the observed fact that the spirit decomposes much more rapidly in partially filled bottles than in full bottles. This observation leads us to infer that part, at least, of the acetic acid is due to oxidation of ethyl nitrite. This oxidation might be expressed in one formula, in which acetic and nitrous acids are formed:

$$C_2H_5NO_2 + O_2 = HC_2H_3O_2 + HNO_2.$$

We may also express this in two stages; in the first we have aldehyde and nitrous acid formed:

$$C_2H_5NO_2 + O = C_2H_4O + HNO_2.$$

In the second the aldehyde is oxidized to acetic acid:

$$C_2H_4O + O = HC_2H_3O_2.$$

It should be further noted that in spite of the greatest care a little nitrous fumes pass over with the distillate in the course of preparation; this admixture, though minute, is sufficient to act as a nucleus, and hence another cause of decomposition under the best conditions for preservation. The effect of water in influencing decomposition is well seen in the case of VII., which contains additional water. The disappearance of acetic acid in the case of I. is probably due to combination between the ethyl radical and it, acetic ether being formed.

Increase in aldehyde may be due to such a reaction as that expressed in the first stage of the formula given, effected either by direct oxidation or by the action of nitrogen acids upon ethyl compounds. An explanation which is not without interest, though purely suggestive, is that it is due to depolymerization of paraldehyde. You are aware that Mr. Williams stated at Southport that he had a strong suspicion that sweet spirit of nitre contains paraldehyde, which he says is formed during the ordinary process adopted in making the spirit. Well, assuming that paraldehyde (boiling at 124°C.) is capable of passing over with the distillate between 70°. and 80°C., we would expect that the action of nascent nitrous acid would be to resolve it into aldehyde, and hence an increase. I show you some "pure paraldehyde" which has been so treated and you will notice that the pleasant odor of paraldehyde has been replaced by the pungency of aldehyde, and it

gives the aldehyde resin reaction, whereas the untreated paraldehyde does not.[1] If I have the opportunity of making a further communication on this subject, I shall return to this question of the increase of aldehyde.

In conclusion I may be allowed a few remarks on the relation which these results have to everyday pharmacy. I have been partly led to make this communication from the continually reiterated statement that "spt. æther. nit., B. P., is quite unfit for use," and that "the ·850 spirit keeps much better," the inference being that the latter is the better preparation. If any proof to the contrary is required we have it in Mr. Symons's paper, in which he gives the result of analysis of six samples of the ·850 article, only two of which indicated over 1 per cent. of ethyl nitrite and two were under 0·4 per cent.,—these percentages including free acid. In the course of this paper results of experiments with the ·850 spirit are given, and it will be seen that it is subject to increase of density and acidification,—of course, this spirit never gives a separation. Now, the arguments used against the official spirit are, 1st, that the public will not have it, and 2d, that its acidity renders it unfit for dispensing. The first argument is certainly serious looking, but a number of pharmacists tell me that they never have kept anything but the official spirit, and their experience is that after a serious of explanations to their customers they will have nothing else, which is a very wise decision on the part of the customers. To discard the spirit on account of the second argument is of course absurd, for we are legally required to use only the official spirit in compounding physicians' prescriptions. Practically, however, the objection is merely one of degree. In the common ·850 spirit, the acidity is less, because the ethyl nitrite content is extremely small; if pharmacists, therefore, prefer to keep this spirit on account of a vague idea that it is a "better keeping" one, they assume a very serious responsibility. The proportion of ethyl nitrite in the official spirit might no doubt be judiciously decreased and fixed, but even though it were fixed at 2 per cent., it is evident that the objection would only be lessened and not removed. It is, therefore, left to the pharmacist to control deterioration by careful storage of his stock. Hydrocyanic acid is kept in small phials, so that *it* may not deteriorate; so might we keep spt. æther. nit. in proportionately smaller bottles than at present, with equal care.

[1] On this point see abstract of article by A. P. N. Franchimont, "Journ. Chem. Soc.," xliv., 453.

The shop round need not be of the largest series or nearest the shop window, and stored stock should certainly not be kept in partially filled Winchesters, nor need we lay in a stock which will serve the better part of the solar year.

For the purposes of this investigation, Messrs. J. F. Macfarlan & Co. have liberally supplied me with spt. æther. nit., B. P., and other material, for which I desire to thank them. My thanks are also due to Mr. Dott for much technical information.--*Phar. Jour. and Trans.*, April 12, 1884, p. 817.

SPIRIT OF NITROUS ETHER.[1]

By D. B. Dott, F. R. S. E.

In this paper on sweet spirit of nitre I have no intention of taking up the slippery subject of its composition and transformations, which Mr. MacEwan has been bold enough to tackle; but am only desirous of discussing the characters and tests of this important preparation. Before doing so, however, it is necessary to refer briefly to what is known of its composition, in order that we may decide what tests it ought to answer. To fix exactly the composition of sweet spirit of nitre is doubtless a problem beyond the attainments of chemical analysis, but there is no reason why we should not have a better knowledge of its chemistry than we at present possess. We may safely say that ethyl nitrite, acetic aldehyde, nitrous and acetic acids, and ethyl acetate, are normal constituents of spiritus ætheris nitrosi. It has been almost universally recognized that the value of the preparation depends on the presence of the nitrite, though this has been doubted by a few writers. Among these is Mr. Abraham, of Liverpool, who believes the aldehyde to be the active ingredient. According to this view the aldehyde is oxidized to acetic acid, which forms acetates with the alkalies of the blood, whereupon the physiological effects are manifested. If I rightly follow this train of reasoning, it would appear that one may as well swallow a little vinegar as take a dose of sweet spirit of nitre. Not being a pharmacologist, I wrote to Professor Matthew Hay, of Aberdeen, on the matter, and have received from him a very interesting letter, from which I cannot do better than quote a few sentences.

[1] Read at an Evening Meeting of the North British Branch of the Pharmaceutical Society, March 19, 1884.

"With regard to aldehyde, I cannot at the present moment recall having seen any notice of its physiological action. I rather think it has not to any extent been investigated. But although that is probably so, I am fairly certain, judging from its chemical relationship to alcohol and the ethers, that in action it will differ to no great extent from these."

"With regard to the sweet spirit of nitre, my opinion is this, that its most active ingredient ought to be the nitrite of ethyl, which it is believed to contain, to, I think, the extent of 2 per cent. But so far as my observation carries me, nitrite of ethyl is present in very variable quantity in the ordinary spirit of nitrous ether, and is sometimes hardly to be detected at all. The nitrite is very active even in very small quantity; and, I believe that if a preparation of spirit. æth. nit. could be obtained containing a constant proportion of nitrite of ethyl, it would be a great gain to practical pharmacy and to therapeutics. The unreliability of the common forms of it has, I believe, led largely in recent years to its disuse."

"Murrell states that nitroglycerin is powerfully diuretic, and I have shown that nitroglycerin is decomposed into nitrite in blood, hence its physiological action—hence diuresis."

I am glad to have my own opinion confirmed by so eminent an authority. We may, therefore, conclude that the right means of estimating a sample of spirits of nitre is to determine the amount of nitrous ether, or rather, of nitrous acid, which it contains. I am far from denying that the medicinal value of the spirit may be materially enhanced by the aldehyde and acetic ether, but these may be regarded as quite subordinate. Besides, it is difficult to estimate their amount.

Let us now consider, one by one, the tests of the British Pharmacopœia. Firstly, we have the specific gravity, which is given as ·845, at 60° F. This is really only a safeguard against admixture with water, though there is a delusion, still to some extent prevalent, that the ·850 must be a better article than the ·845. Doubtless this has arisen from the fact that nitrous ether has a greater density than rectified spirit. It has therefore been supposed that a preparation rich in nitrous ether will have a high specific gravity, but this is a mistake; for it is easy to prepare a spirit fully up to the Pharmacopœia requirements with a specific gravity even less than ·845. According to our experience a high specific gravity just means so much the more water, and if one fact regarding spirit of nitre has been proved more con-

clusively than another, it is, that water encourages the decomposition of the ether. Whence it is manifest that the specific gravity ought to be kept as low as possible consistent with the due proportion of ethyl nitrite.

Secondly, "it effervesces feebly or not at all when shaken with a little bicarbonate of potash." Not much can be said against this test, though it is perhaps a little indefinite. It might be better to have a limit fixed to the amount of free acid, the same to be determined by standard alkali—but this is doubtful.

Thirdly, "if it be agitated with twice its volume of saturated solution of chloride of calcium in a closed tube, 2 per cent. of its original volume will separate in the form of nitrous ether and rise to the surface of the mixture." This test has given rise to much controversy. It belongs to the class of inaccurate empirical tests, which are always unsatisfactory, though sometimes tolerable when nothing better can be obtained. Chemists have all recognized that the "ethereal fluid," which separates under the above circumstances, is not ethyl nitrite, but a solution of the same, of variable strength. It is probably just as well that it is so, especially when the testing is performed on a warm summer day. Judging from some estimations which I made by the method subsequently described, this etheric fluid would seem to contain from 50 per cent. to 60 per cent. of nitrous ether. Professor Attfield[1] says that it contains less than half its bulk of ethyl nitrite. Professor Redwood[2] is responsible for the generally accepted belief that 2 per cent. of separation indicates 10 per cent. of ether. If made regarding the "ethereal fluid," which actually separates, the statement may be fairly correct, but it is quite untrue if applied to a 10 per cent. solution of ethyl nitrite in spirit. Such a solution will separate more than half its contained ether when agitated with solution of calcium chloride. I have tried many experiments with this test, but it would be superfluous to detail them. Suffice it to say that there are three main factors which determine the amount separated:—

1st. The composition of the spirit.

2d. The temperature.

3d. The dimensions of the tube.

Regarding the first of these I would only remark that if the spirit

[1] "Pharm. Journ.," [3], viii., 378.

[2] "Pharm. Journ.," [2], viii, 508.

is watery it will give a better result, *cæteris paribus*, than one containing less water. It will readily be understood that with a compound having so low a boiling point, and so high a vapor pressure at ordinary temperatures as nitrous ether, the proportion separated by chloride of calcium solution must be much affected by the second and third of these causes; *e.g.*, 15 cc. of spiritus ætheris nitrosi at 48°F., shaken up with two vols. solution of calcic chloride at same temp., gave a separation of 0·4 c c. When the experiment was repeated with the spiritus and chloride solution at the temp. of 68°F., separation of only 0·2 cc. was obtained. By using a capacious tube in one case, and in another a small tube which the mixture nearly filled, results almost as variable were observed. It may here be noted that the "ethereal fluid" takes some time to separate, the process being seldom complete in less than half an hour. The greatest objection to this test is, however, the well-known fact that a genuine preparation will after a certain time, and while still retaining its medicinal virtues, fail to give any separated "ether" when agitated with solution of chloride of calcium. Taking all the facts into consideration, I am clearly of opinion that this separation test ought to be abolished.

What we require is a test which shall show at least approximately the value of the preparation, by means of reagents and apparatus at the disposal of every pharmacist. This must be done by estimating the nitrous acid, whether it exists as such or potentially. There does not appear to be any reason for making a separate determination of the percentage of uncombined nitrous acid, which no doubt contributes its share to the physiological action of the substance. Of the many methods which have been proposed for the purpose of this estimation, probably the best is that devised by Professor Eykman, of Tokio. Not that I regard his process as perfect, because I believe it gives results distinctly under the truth, and of course it includes the nitric acid should any be present. The fatal objection to Eykman's process as a pharmacopœial test is the elaborate apparatus and nicety of manipulation required. It is, in short, better adapted for the laboratory of the analyst than for the pharmacy; and as all the official tests ought to be as simple as possible, we must endeavor to find an easier method. I have tried a great number of experiments with this object, and have to confess that the result after all is not a complete success. The old method of saponifying with caustic soda, and after evaporation of the alcohol, titrating with permanganate, was found to yield very variable

results. This is not surprising considering the facility with which potassic permanganate is reduced, and the certainty that there are organic compounds present after evaporation even to dryness. Oxidation of ferrous sulphate was next tried, but from the difficulty of estimating the excess of ferrous salt in the presence of alcohol, and from other causes, the process proved abortive. Volumetric solution of urea was then employed, iodized starch solution being used to indicate the end of the reaction, but this plan proved entirely unsuccessful, chiefly on account of the impossibility of observing a definite end-point. Possibly, however, the urea method might be made available by measuring the N, or weighing the CO_2 evolved; that is to say if the reaction goes as it ought. $CON_2H_4+2HNO_2=CO_2+N_4+3H_2O$.

The nitrous ether might possibly be estimated by reducing with hydric sulphide, but I have not had time to thoroughly examine this reaction. The few experiments I have been able to perform with it did not yield promising results.

After innumerable experiments I have been compelled to return to the method which suggested itself to me first of all, viz., the liberation of iodine from potassic iodide, and titration of the iodine with sodium thiosulphate. The only mention I have seen of the use of potassium iodide as a means of estimating spiritus ætheris nitrosi, is reported in the "Pharmaceutical Journal."[1] In the discussion after the reading of Dr. Dupré's paper, Mr. Hehner suggested the use of iodide of potassium added directly, with addition of acetic acid, which was thought a good idea. The process is so obvious, that it has probably often been tried and abandoned, which would not be surprising, as without particular precautions it yields results which have no resemblance to the truth. In endeavoring to put this test into practical form, I very soon found that the only way of arriving at right results was to work with a solution of ethyl nitrite of known strength; at least in the first place. We therefore purified some of the nitrite by a method similar to that described by Mr. Williams.[2] At 60°F. it had a specific gravity of ·901 (or thereby). Mr. Williams gives the gravity as ·937, but states no temperature. At all events, though it was not analysed, I am confident that it must have been very nearly pure. Ten cc. were diluted to 100 cc. with "absolute" alcohol, and this solution was used in the experiments.

[1] [3], x., 93.
[2] "Pharm. Journ.," [3], viii., 442.

It would be tedious to describe the different devices that have been tried, to ensure, if possible, an accurate result. Suffice it to say, that as an inference from numerous experiments, the following method was adopted as the best:—Let 1 gram of iodide of potassium be dissolved in 10 c.c. of water. Then add 20 cc. of rectified spirit, and to the solution so obtained add 5 cc. of the spirit to be tested. Now pour in 5 cc. dilute sulphuric acid, and allow to stand for an hour, then titrate with standard thiosulphate. The operation is best conducted in an eight ounce porcelain basin. The following are some of the results obtained:—

(5 cc. used in each case.)	$\frac{1}{10}$ $Na_2S_2O_3$ solution.		$EtNO_2$ grams.	$EtNO_2$(vol.) per cent.
(*a*.) 10 per cent. (vol.) solution in alcohol	59·5 cc.	=	·446	= 9·91
(*a*.) 10 per cent. (vol.) solution in alcohol	59.8 cc.	=	·448	= 9·96
(*a*.) 10 per cent. (vol.) solution in alcohol	60·0 cc.	=	·450	= 10·00
(*b*.) Sple. sp. æth. nit. (recent)	26·5 cc.	=	·198	= 4·41
(*b*.) Sple. sp. æth. nit. (recent)	26·8 cc.	=	·201	= 4·46
(*c*.) Sple. sp. æth. nit. (four months)	23·5 cc.	=	·176	= 3·91
(*c*.) Sple. sp. æth. nit (four months)	24·0 cc.	=	·180	= 4·00

Although formerly indicated, it may again be noted that the total nitrous acid is given as ethyl nitrite. The older sample contained much more free acid than the fresh one. The method employed is evidently only approximate, but it may serve until something better is devised. It has, at any rate, the advantage of requiring only such apparatus and reagents as are in common use.

Before concluding, I would venture to express a hope that the compilers of the next pharmacopœia will fix a fair standard of purity for spirit of nitrous ether, so that no departure therefrom will be allowed. We sometimes hear the fallacy propounded, that an inferior preparation must be excused, because, at some time or other, it has been produced by the official process. This is an entire mistake. Not only must the official process be followed, but it must be so conducted as to produce a right result, and the product must be so preserved as to be of proper strength when required for use. Yet, as the pharmacopœia requires of pharmacists preparations of a certain degree of purity, so pharmacists require of the pharmacopœia processes and tests which are reasonable.—*Phar. Jour. and Trans.*, April 12, 1884, p. 819.

A Solution of Gallic Acid may be made according to Dr. F. Long ("Brit. Med. Jour.") by means of potassium citrate. Using 15 grains of each, the mixture will dissolve in 1 ounce of water.

OLIVE OIL AND ITS PRODUCTION.

The following particulars with regard to the production of olive oil in Tuscany have been furnished to Mr. Consul Inglis by one of the principal exporters in Leghorn:

The olive oil produced in Tuscany from the first pressing of the fruit is intended for consumption as an article of food. Hence, great attention is paid both to the culture of the olive tree and the process of making oil.

The olive crop is subject to many vicissitudes, and is an uncertain one. It may be taken as a rule that a good crop does not occur more frequently than once in three years. A prolonged drought in summer may cause the greater part of the small fruit to fall off the trees. A warm and wet autumn will subject the fruit to the ravages of a maggot or worm, which eats its way into it. Fruit thus injured falls to the ground prematurely, and the oil made from it is of very bad quality, being nauseous in taste and somewhat thick and viscous. Frost following immediately on a fall of snow or sleet, when the trees are still wet, will irretrievably damage the fruit, causing it to shrivel up and greatly diminishing the yield of oil, while the oil itself has a dark color, and loses its delicate flavor.

The olive tree in Tuscany generally blossoms in April. By November the fruit has attained its full size, though not full maturity, and the olive harvest generally commences then. The fruit, generally speaking is gathered as it falls to the ground, either from ripeness or in windy weather. In some districts, however, and when the crop is short, the practice is to strip the fruit from the trees early in the season. When there is a full crop the harvest lasts many months, and may not be finished till the end of May, as the fruit does not all ripen simultaneously. Oil made early in the season has a deeper color, and is distinguished by a fruity flavor, with a certain degree of pungency; while as the season advances it becomes lighter in color, thinner in body, and milder and sweeter in taste. Oil made towards the close of the harvest in April or May from extremely ripe fruit is of a very pale straw color, mild and sweet to the taste, though sometimes, if the fruit has remained too long on the trees, it may be slightly rancid. Oil very light in color is much prized in certain countries, notably France; and hence, if it also possesses good quality, commands a higher price in the Tuscan markets.

The fruit of the olive tree varies just as much in quality as does the grape, according to the species of the tree itself, the nature of the soil, exposure, and climate of the locality where it grows. Some varieties of the olive tree largely grown, because thought to be better suited to the special conditions of some districts, yield a fruit which imparts a bitter taste to the oil made from it; such oil, even when otherwise perfect, ranks as a second rate quality. The highest quality of oil can only be obtained when the fruit is perfectly and uniformly sound, well ripened, gathered as soon as it has dropped from the trees, and crushed immediately with great attention. Should the fruit remain any time on the ground, particularly during wet weather, it deteriorates fast and gets an earthy taste; while if allowed

remain an undue length of time in the garners it heats, begins to decompose, and will yield only bad oil.

The process of making oil is as follows: The fruit is crushed in a stone mill, generally moved by water power; the pulp is then put into bags made of fibre, and a certain number of these bags, piled one upon another, are placed in a press, most frequently worked by hand; when pressure is applied, the oil flows down into a channel by which it is conveyed to a receptacle or tank. When oil ceases to flow, tepid water is poured upon the bags to carry off oil retained by the bags. The pulp is then removed from the bags, ground again in the mill, then replaced in the bags and pressed a second time. The water used in the process of making oil must be quite pure; the mill, press, bags and vessels sweet and clean, as the least taint would ruin the quality of the oil produced. The oil which has collected in the tank or receptacle just mentioned is removed day by day, and the water also drained off, as oil would suffer in quality if left in contact with water; the water also, which necessarily contains some oil mingled with it, is sent to a deposit outside, and at some distance from the crushing house, which is called the "Inferno," where it is allowed to accumulate, and the oil which comes to the surface is skimmed off from time to time. It is fit only for manufacturing purposes. After the second pressing the olive pulp is not yet done with; it is beaten up with water by mechanical agitators moved by water power, and then the whole discharged into open-air tanks adjoining the crushing-house. There the crushed olive kernels sink to the bottom, are gathered up and sold for fuel, fetching about 12 francs per 1,000 kilos., while the *débris* of the pulp is skimmed off the surface of the tank and again pressed in bags, yielding a considerable quantity of inferior oil, called "Olio lavato," or washed oil, which, if freshly made, is even used for food by the poorer classes. The pulp then remaining has still a further use. It is sold for treatment in factories by the sulphide of carbon process, and by this method yields from 7 to 9 per cent. of oil; of course suitable only for manufacturing purposes. Only the first two pressings yield oil which ranks as first quality, subject of course to the condition of the fruit being unexceptionable. New oil is allowed to rest awhile in order to get rid of sediment; it is then clarified by passing through clean cotton wool, when it is fit for use.

The highest quality of olive oil for eating purposes should not only be free from the least taint in taste or smell, but possessed of a delicate appetizing flavor. When so many favorable conditions are needed as to growth, maturity and soundness of the fruit, coupled with great attention during the process of oil making, it is not to be wondered at that by no means all or even the greater part of the oil produced in the most favored districts of Tuscany is of the highest quality. On the contrary, the bulk is inferior and defective. These defective oils are largely dealt in, both for home consumption and export, when price and not quality is the object.

In foreign countries there is always a market for inferior defective olive oil for cooking purposes, etc., provided the price be low. Price and not quality is the object, so much so that when olive oil is dear, cotton-seed,

ground-nut and other oils are substituted, which bear the same relation to good olive oil that butterin and similar preparations do to real butter.

The very choicest qualities of pure olive oil are largely shipped from Leghorn to England along with the very lowest qualities, often also adulterated.

The oil put into Florence flasks is of the latter kind. Many years back this was not the case, but now it is a recognized fact that nothing but the lowest quality of oil is put into these flasks; oil utterly unfit for food, and so bad that it is a mystery to what use it is applied in England. Importers in England of oil in these flasks care nothing, however, about quality; cheapness is the only desideratum.

The best quality of Tuscan olive oil is imported in London in casks, bottled there, and bears the name of the importers alone on the label. There is no difficulty in procuring in England the best Tuscan oil, which nothing produced elsewhere can surpass; but consumers who wish to get, and are willing to pay for the best article, must look to the name and reputation of the importers and the general excellence of all the articles they sell, which is the best guarantee they can have of quality.—*Phar. Jour. and Trans.*, May 17, 1884, p. 923.

AMERICAN PHARMACEUTICAL ASSOCIATION.

The thirty-second annual meeting of this association will be held at the city of Milwaukee, Wis. The first session will begin at 3 P. M., on Tuesday the 26th day of August, 1884, in Turner Hall. All pharmaceutical organizations entitled to representation in this association are invited to appoint delegates; five from each body, whose credentials should be sent to the Permanent Secretary, Prof. J. M. Maisch, Philadelphia, at least two weeks in advance of the time of meeting. Applications for membership must be accompanied by the fee, and should, if possible, be sent to the Chairman of the Committee on Membership, Mr. G. W. Kennedy, Pottsville, Pa., at least two weeks prior to date of meeting.

As great interest is always shown in the answers made to the queries previously propounded, it is urged upon members who have accepted queries to be answered at this meeting, to have their papers forwarded to the Chairman of the Committee on Papers and Queries, Prof. J. U. Lloyd, Cincinnati, as early as possible that time may be provided both for reading and discusssing them. This request applies also to those offering volunteer papers.

Ample room has been provided in Turner Hall, the place of meeting, for the exhibition of articles possessing pharmaceutical interest and not prohibited by the rules of the association. The exhibition room is in charge of the Local Secretary, Mr. Henry C. Schranck, Milwaukee, Wis., to whom all applications for space must be addressed.

As soon as the schedule of reduced railway fares has been completed by the Committee on Railroads, it will be announced in a circular from the Permanent Secretary.

The Committee in charge of all the arrangements for the social entertainment of the members of the association on this occasion, will soon make known to us their programme of pleasure.

W. S. THOMPSON, *President.*

Washington, D. C., June 18, 1884.

PHARMACEUTICAL COLLEGES AND ASSOCIATIONS.

THE IOWA STATE PHARMACEUTICAL ASSOCIATION held its fifth annual meeting in Marshalltown, May 27, President J. H. Harrison in the chair. Mayor Frisbee and Dr. McBride spoke words of welcome. The President delivered his annual address, and the various officers and committees presented their reports; the Treasurer reported a deficit of $118.34, and about $600 due from members. The sessions were chiefly devoted to routine business and to discussions on trade interests. Papers were read by J. W. Ballard, on Tincture of Iron; by Mrs. Rosa Martin, on Kousso; by Dr. Graham, on Secret and Non-secret Medicines; and by E. Wiebenson, on the Strength of Commercial Ammonia Water. J. A. King and T. C. Ballard, of Chicago, and P. J. Singer, of Peoria, were elected honorary members. The officers for the present year are: Dr. W. S. McBride, Marshalltown, President; M. W. Ward, Des Moines, A. H. Miles, Des Moines, and C. R. Wallace, Independence, Vice-Presidents; E. Boerner, Iowa City, Secretary; and C. H. Ward, Des Moines, Treasurer. The next meeting will be held at Council Bluffs, on the second Monday of June, 1885.

After the final adjournment, on the evening of May 28th, the members of the Association attended the dramatic performance of the "Queen's Evidence," at the Opera House, and afterward sat down to a banquet at the Music Hall.

KENTUCKY PHARMACEUTICAL ASSOCIATION.—The seventh annual meeting was held in Louisville, May 21 and 22. The usual routine business, reports of officers and committees, and several papers were brought forward and discussed. Mr. Jefferson Oxley, of Nicholasville, was elected President; J. F. Cook, of Harrodsburg, Secretary; and H. Evans, of Danville, Corresponding Secretary.

MASSACHUSETTS STATE PHARMACEUTICAL ASSOCIATION.—The third annual meeting was held at Lowell, June 4 and 5, and was welcomed by Mr. F. H. Butler. President S. A. D. Sheppard presided; his annual address contained many excellent suggestions. The various officers and committees made their reports, and, besides the routine business, discussions were had on several subjects of trade interests; a number of papers were read and the following officers were elected: C. B. Emerson, Haverhill, President; J. W. Colcord, Lowell, Secretary; and F. H. Butler, Lowell, Treasurer. The next meeting will be held in Pittsfield, on the first Wednesday in June, 1885. After adjournment an excursion was had

up the Merrimac River to Tyng's Island, where several hours were spent in pleasant intercourse.

THE MISSISSIPPI STATE PHARMACEUTICAL ASSOCIATION held its meeting at Aberdeen, May 20, Dr. J. M. Eckford presiding. Routine business, the reports of officers and committees, and discussions on trade interests occupied the time of the meeting. The officers of the previous year were re-elected, and the Association adjourned to meet next year at Natchez.

THE MISSOURI STATE PHARMACEUTICAL ASSOCIATION held its sixth annual meeting at Brownsville (Sweet Springs), June 10, 1884. The meeting was called to order at 3 P. M.

The President, Prof. O. A. Wall, M. D., delivered an address replete with wise suggestions and counsel. The Treasurer and Secretary's reports were read; also the reports of the various committees. Fifty-two new members joined the Association.

Officers were elected for the ensuing year: President, Prof. O. A. Wall, M. D., St. Louis; Vice-Presidents, A. F. Fleischman, Sedalia; H. C. Churchill, Windsor, and H. C. Arnold, Kansas City; Treasurer, J. M. Good, St. Louis; Permanent Secretary, G. H. Chas. Klie, St. Louis; Local Secretary, J. J. Thorn, Brownsville.

Papers were read as follows: On Emulsions, by Prof. J. M. Good; Notes on Fluid Extracts, Percolation and Repercolation, by G. H. Chas. Klie; On Ozokerite, by F. W. Sennewald; On Tasteless Iron Preparations, by Dr. H. M. Pettit; Some of the Precautions to be Taken in Preserving Drugs and Preparations, by Prof. O. A. Wall, M. D.

The following resolution was adopted:

Resolved, That as an association we discountenance the selling of all patent medicines and proprietary articles at less than retailers list prices, and that we urge all members of this association to become signers of the Campion plan, and to assist in the formation of local associations for the protection of trade interests and the maintenance of prices.

Section two was added to Art. iii. of the constitution. It reads: Any person who has been a member of this Association for two years may become a life member by the payment, in advance, of ten years annual dues and the sum of two dollars for a certificate of membership.

The place was good, the weather was good, attendance good, hotel accommodations good, mine host was good, the humor of members was good, result—a good time all around. The next meeting will be held at same place on the fourth Tuesday in June, 1885.

THE NEW YORK STATE PHARMACEUTICAL ASSOCIATION held its sixth annual meeting in the lecture room of the New York College of Pharmacy, June 10 to 12. President F. K. Sweet in the chair. The President's address was devoted to the pharmacy law recently passed for the State, to various trade interests and to the internal affairs of the Association. The Treasurer showed a balance on hand amounting to $1,438.58. The different committees presented their reports and the following officers were elected: President, Wm. H. Rogers, Middletown; Vice-Presidents, Julius Rieffen-

stahl, Buffalo, T. J. Macmahan, New York, and A. Sager, Portland; Secretary, Clay W. Holmes, Elmira; Treasurer, C. H. Butler, Oswego. The following papers were read during the meeting: On Daturine, by J. A. Hartz; A Plea for Botany, by A. B. Huested; On Trade Interests, by C. Z. Otis; The Requisites of a Pharmacist, by T. L. Corwin; Fifty Years Reminiscences of the Drug Trade, by J. S. Higgins. The Association finally adjourned to meet at Saratoga, on the second Tuesday of June, 1885.

Drives through Central Park, a reception at the Park Avenue Hotel, a ball, and after adjournment, a steamboat excursion around the harbor of New York constituted the entertainments.

THE OHIO STATE PHARMACEUTICAL ASSOCIATION held its sixth annual meeting in Dexter Hall, Cincinnati, May 27 and 28. President West in the chair. After addresses of welcome by Mayor Stephen and Mr. G. Merrill, the President delivered his annual address, dwelling more particularly upon the pharmacy law and the food and drug adulteration law passed last winter, and urging the organization of local pharmaceutical associations. Reports were also read from the different officers and committees, and the following papers were presented: On the Purity of Quinine, and On Hoffman's Anodyne, by Virgil Coblentz; On Salicylic Acid, by J. Winchell Forbes; On Extracts of Malt, by J. L. Irwin, and Jackson's Cough Syrup, by J. U. Lloyd. In addition to the two formulas for *Jackson's cough syrup*, published in this journal in 1852, p. 35, and 1856, p. 205, the last mentioned paper communicates two formulas, of which the following is used in Cincinnati: Extr. ipecac. fluid. fʒss, extr. senegæ fluid. fʒiij, extr. rhei fluid. fʒiv, morphinæ sulph. gr. viij, ol. sassafras gtt xxxij, Syr. simpl. q. s. ad Oij.

The officers for the present year are: President, John Weyer, Cincinnati; Vice-Presidents, W. J. Martin, Cincinnati, and M. D. Fulton, Bucyrus; Secretary, L. C. Hopp, Cleveland, and Treasurer, Chas. Huston, Columbus, The next meeting will be held at Sandusky on the third Wednesday of May, 1885.

A reception at the Grand Hotel, a concert, a visit to the Zoological garden and drives to various parts of the surroundings entertained the visitors in the evenings and after adjournment.

THE PENNSYLVANIA PHARMACEUTICAL ASSOCIATION held its annual meeting at Wilkesbarre, June 3 and 4, and was welcomed by Mayor Bodrick. President J. B. Duble occupied the chair and read his annual address, dealing with the proposed pharmacy law, the patent medicine evil, the cutting of prices, etc. Reports were read from the Secretary, Treasurer and different committees, that of the Treasurer showing a balance on hand of $259. The officers elected are President, Charles H. Cressler, Chambersburg; Vice Presidents, Charles T. George, Harrisburg, and L. Wolff, M. D., Philadelphia; Treasurer, Joseph L. Lemberger, Lebanon; Secretary, J. A. Miller, M. D., Harrisburg. Two poems were presented by the bards of the association, and twenty-eight papers were read and discussed; these were

on the following subjects: The Use of the Microscope in Pharmacy, by L. A. Ridgway; Testing of Commercial Glycerin, by G. W. Kennedy; the Weights of Volumes of Different Preparations at Different Temperatures, by G. Pile; Boroglyceride, by L. E. Sayre; Fictitious Liquors, by J. T. Rodman; the Insectiside Value of Commercial Insect Powder, by W. H. McGarrah; Extract of Malt, by A. Robbins; Medicated Waters, by J. W. Landis; Infusion of Digitalis, W. B. Thompson; the Preparation of Benzoates, by S. H. Stevens; Granulated Magnesium Citrate, by W. L. Turner; Convallaria Majalis, by F. M. Bouton; Plaster Spreading, by W. B. Thompson; Use of Caramel, by A. Blair; Soluble Gun Cotton, by G. Pile; the Luray Cave, by H. Kingsbury; Carbonate in Bromide of Potassium, by L. E. Sayre; the Sale and Use of Nostrums, by C. F. Randolph; Organization of the Legitimate Pharmacists, by M. N. Kline; Condition of Pharmacy in Pennsylvania, by G. W. Stoeckel; Responsibility of Pharmacists for the Quality of Remedies, by J. W. Ridpath; Lactic Acid of American Manufacture, by J. L. Lemberger; Proper Education of Apprentices, by S. H. Stevens; Cultivation of Medicinal Plants, by C. L. Lochman; Cod Liver Oil, by R. J. Hardy; Medical and Surgical Knowledge of Druggists, by H. Pursell; Pharmacists as Physicians, by S. T. Barton; Oil of Ergot, by C. T. George. It was resolved that the portrait of the late Dr. George Ross be procured for the proceedings. The Association adjourned to meet at Erie on the first Tuesday of June, 1885.

THE TEXAS PHARMACEUTICAL ASSOCIATION met at Waco, May 13, President E. M. Wells in the chair. The President's address, reports of officers and committees and the proposed pharmacy law claimed the principal attention of the Association. The officers for the current year are: President, E. M. Wells, Fort Worth; Vice Presidents, F. Kalteyer, San Antonio; W. J. Morley, Austin, and J. B. Moore, Cameron; Secretary, J. H. Bradley, Taylor; Treasurer, E. W. Lancaster, Marshall; Local Secretary, G. H. Kalteyer. The next meeting will be held in San Antonio in the spring of 1885, the date to be fixed by the executive officers. The pharmaceutical supper at the McClelland Hotel on May 15, must have been a very enjoyable affair. The printed bill of fare before us states that it was perfumed with carbon bisulphide and iodoform; of the lengthy *ménu* we copy only the "pastry" which consisted of cantharidal collodion, Tellurium pie with calcium crust, manganese and cobalt custard and sulphur teroxide with cream; after such a repast the final dessert properly closed with Hydrogenium protoxide.

THE VIRGINIA STATE PHARMACEUTICAL ASSOCIATION held its annual meeting in Lynchburg, May 20, President C. A. Santos in the chair. The following officers were elected for the current year: President, W. A. Strother, Lynchburg; Vice Presidents, R. H. Stratton, Gordonville; E. H. Craighill, Lynchburg, W. D. Hudson, Alexandria; B. H. Gorrell, Lexington; Secretary, E. R. Beckwith, Petersburg; Treasurer, F. H. Masi, Norfolk; Corresponding Secretary, T. R. Baker, Richmond.

REVIEWS AND BIBLIOGRAPHICAL NOTICES.

Proceedings of the American Pharmaceutical Association at the Thirty-first Annual Meeting, held at Washington, D. C., September, 1883. Philadelphia: Published by the American Pharmaceutical Association, 1884. 8vo. Pp. 577. Price, in paper, $5; bound, $5.50.

After many vexatious delays, the printing and binding of this volume has sufficiently advanced to announce its distribution during the second week of July. In arrangement, etc., it resembles the preceding volumes, the first 306 pages being filled with the report on the progress of pharmacy, and this is illustrated with a number of wood-cuts. The volume is embellished with the portrait of the late Dr. Wm. Neergaard, of New York.

Grundriss der Pharmakognosie. Von F. A. Flückiger. Berlin: R. Gaertner's Verlagsbuchhandlung, 1884. Pp. 260.

Outlines of Pharmacognosy.

As the title indicates, this little work is intended to give the outlines of descriptive materia medica only; as such, it is admirably adapted for a text-book for pharmaceutical students, and at the same time the descriptions are sufficiently full to serve as a guide also for others interested in this subject. In his classical work entitled "Pharmakognosie des Pflanzenreiches," the author has classified the drugs from morphological, and partly also from chemical characters, in the Outlines, however, the natural system of botany is followed, as being more advantageous and inciting, and less tedious. In this respect opinions are much at variance. Botanical classification is doubtless the only proper one for the study of medical or pharmaceutical botany; but it appears to us that for the systematic study of parts of plants not accompanied by the organs essential for botanical classification, the morphological characters serve a better purpose, at least for comparison with the same parts of other plants having a similar appearance. The work is written in that clear and entertaining style, for which the author is noted, and is a most valuable addition to pharmaceutical literature.

Twentieth Annual Report of the Alumni Association, with the exercises of the Sixty-third Commencement of the Philadelphia College of Pharmacy for the year 1883-84. 8vo. Pp. 156.

In addition to what may be gleaned from the title page, the pamphlet contains also the addresses and lectures delivered at the five social meetings of the Alumni Association, the twentieth anniversary of whose organization occurs on the 15th of July this year.

Address on Practical Medicine. By John V. Shoemaker, A.M., M.D. Delivered before the American Medical Association May 7, 1884.

How to Grow Fine Celery. A new method by Mrs. H. M. Crider, York, Pa. 1844. Price 25 cents.

EDITORIAL DEPARTMENT.

THE MILWAUKEE MEETINGS.—In less than two months the pharmacists and druggists of the United States and Canada will assemble in Milwaukee and hold two separate meetings, the one confining its deliberations to the so-called trade interests, while the other is devoted mainly to the scientific branch of practical pharmacy. The American Pharmaceutical Association will meet August 26th, and its sessions will probably extend over four days, while the National Retail Druggists Association will probably close this year's deliberations on Monday August 25th, or, on the morning of Tuesday. The official notices of these meetings will be found on another page and among the advertisements; in this place we desire to quote from the president's, Henry Canning, call for the meeting on Monday; he says:

Many powerful local organizations have sprung into existence as the possibility of good results from the N. R. D. A movement began to be foreseen. It is now more than ever necessary to band together locally, in order to carry out what would perhaps never have been accomplished, were it not for this National organization, an infant less than a year ago, already the parent of many promising children.

The Campion movement started out with thirteen signers, a somewhat significant number, and generally laid down as an unlucky one. This glorious Nation started out, however, with just thirteen members, and is now a living illustration of the exceptions to the rule. Much has been said against this attempt to better the mercantile side of our business, from two prominent sources, viz: those chronically and apathetically looking on, and ever holding to the notion that it "cannot be cured, but must be endured;" and those other few, crying out to their brethren that the movement "is undignified and unworthy the Pharmacist," forgetting that we are in a certain sense tradesmen, as well as professional members of society. The former class are only too ready to accept the results of our labors, and are quite as likely to become suddenly very zealous, and to join the "I-told-you-so" ranks. To the latter class, I can only say, that I refer them respectfully to the membership roll of the N. R. D. A.; there they will find the names of very many of the ablest Pharmacists of the land—jealous, too, of the honor of their profession. They fully realize that this rampant tendency to monopoly, which characterizes the age, is making serious inroads in their business, which, from its responsible nature, ought to retire them at a respectable age. This war on Proprietary goods is demoralizing in its effects to the entire mercantile or money-making part of their business. Why should we not attempt, then, to regulate the sale of these arbitrary goods, and if we must handle them (knowing the public will have them), do so only on a fair margin?

Do not, my friends, consider that the mission of the N. R. D. A. ends with the settlement of this one question. Besides the fulfillment of this movement, as yet only fairly begun, there are many things remaining to be done. I will here cite but one reason, among the many, that ought to make every druggist in the land who loves his calling send in his name and dollar, and that is,—that we might by *one gigantic voice* memorialize our law-makers in Congress, to repeal or modify the odious and stigmatizing Retail Liquor Tax, a law which now places us in *title and in fee* on the same level with him who literally deals out his poison to the ruin of mankind. Would not the voice of ten or twenty thousand unwilling, but patient, sufferers be heard? With a gigantic National organization much can be done for the common good; and the common good is the individual good. Co-operation is the only remedy to counteract the monopolistic tendency of the age.

OBITUARY.

PETER SQUIRE, F.L.S., and an Honorary Member of the American Pharmaceutical Association, died in London, April 6th, 1884, at the ripe age of 86 years. He was born at Stratton, Bedfordshire, in 1798, entered the drug business as an apprentice at the age of fourteen, and was subsequently engaged in several establishments in London, and also in Paris. About the year 1831 he bought the business in Oxford street, with which he remained associated for upwards of half a century. The numerous improvements introduced by him in the preparation of extracts, and in the preservation of the juices of medicinal plants and his success as a practical pharmacist soon gave him prominence. In 1837 he was appointed chemist in ordinary on the establishment of Queen Victoria. He was one of the original members of the Pharmaceutical Society of Great Britain, was elected a member of the first Council and of the first Board of Examiners in 1842, and continued to serve in both capacities until 1870 and 1869 respectively, filling for several years the office of President of the Pharmaceutical Society. Mr. Squire's work, published in 1851, in which the London, Edinburgh, and Dublin Pharmacopœias were compared, forcibly showed the necessity for greater uniformity throughout Great Britain in medicinal preparations. This was finally accomplished under the provisions of the Medical Act of 1858, and the British Pharmacopœia made its appearance in 1864. The "Companion to the British Pharmacopœia," the thirteenth edition of which appeared in 1882, compares the Pharmacopœias of the United States and of six European countries with that of Great Britain. Mr. Squire also collected the formulas used at the principal hospitals of London and classified them for ready comparison in "The Pharmacopœias of the London Hospitals."

In 1881 Mr. Squire was a member of the fifth International Pharmaceutical Congress, and was selected one of the vice presidents; he contributed a paper in which the great diversity in the strength of many important galenical preparations was shown as recognized by the pharmacopœias then in use.

The London "Pharmaceutical Journal" says of him: "Throughout his life, from boyhood to old age, Peter Squire was active, persevering, industrious and self-reliant. Whilst some of his characteristics were too marked to allow him always to escape criticism, yet if his opponents had survived, instead of preceded him, as most of them have done, they would have been among the first to proclaim that in Peter Squire pharmacy has lost a sterling man."

PHILLIP LIONEL MILLEMAN, a graduate of the Philadelphia College of Pharmacy (class 1866), died in Chicago, May 8th, 1884, aged 42 years. The deceased was a native of Alsace, learned the drug business in Chicago, where he established himself a few years after he graduated. He contributed several practical papers to this Journal.

We have also received notice of the death of the following graduates of the same College:

PAUL FREDERICK LEHLBACH (class 1863), died in New York city, April 28th; he was a trustee of the New York College of Pharmacy.

JOHN BEATTY PRICE (class 1874), died in Wilmington, Del., where he had learned the drug business with E. Bringhurst & Co.

WM. WOOD STOCKTON, of Mount Holly, N. J. (class 1876).